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9

10 UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
11 REGION 9

12 In the matter of:)

13 Montrose Chemical Corporation of)
California,)

14)
15)
16 RESPONDENT)

17 Proceeding Under Sections 106 and)
18 122 of the Comprehensive Environ-)
mental Response, Compensation,)
19 and Liability Act of 1980)
(42 U.S.C. §§ 9606 and 9622),)
20 as amended by the Superfund)
Amendments and Reauthorization)
Act of 1986.)

SECOND AMENDMENT TO
ADMINISTRATIVE ORDER ON
CONSENT U.S. EPA Docket
No. 85-04

21
22 I. INTRODUCTION

23 On May 6, 1983, EPA issued a CERCLA § 106 order to Montrose
24 Chemical Company of California ("Montrose") which directed the
25 company to undertake appropriate environmental investigations and
26 remedial action at and in the vicinity of the former Montrose
27 Manufacturing facility in Los Angeles, California ("Montrose")
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1 Site" or the "Site"). Based on subsequent investigations, EPA
2 proposed the Site for inclusion on the National Priorities List
3 and developed a workplan dated October 1984 (the "Workplan") for
4 the performance of a CERCLA Remedial Investigation ("RI") and
5 Feasibility Study ("FS") (collectively "RI/FS") at and in the
6 vicinity of the Site.

7 In October 1985, EPA and Montrose entered into an Ad-
8 ministrative Order on Consent, U.S. Docket No. 85-04 (the
9 "Consent Order"), pursuant to which Montrose has undertaken por-
10 tions of the remedial investigative work ("RIW") specified in the
11 Workplan. In the Consent Order, EPA, among other things,
12 retained the right to conduct other investigatory work not per-
13 formed by Montrose, to perform the FS for the Site and to recover
14 the costs of that work and any other past and future oversight
15 costs from Montrose. In the Consent Order, EPA also retained the
16 right to compel Montrose to perform additional tasks as part of
17 the RI/FS including remedial investigative work and/or engineer-
18 ing evaluations of alternatives and remedial action that might be
19 required at the Site. The Consent Order was amended on October
20 28, 1987, to make certain adjustments to the RIW which were war-
21 ranted on the basis of information gathered during the initial
22 phase of Montrose's investigation.

23 Pursuant to Article IV(K) of the Consent Order, EPA has
24 determined that it is appropriate for Montrose to conduct the FS
25 required by the Workplan with oversight by EPA. Therefore, the
26 purpose of this Second Amendment to Administrative Order on Con-
27 sent ("Second Amended Order") is to provide for Montrose's (as
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1 opposed to the EPA's) performance of the FS, and to provide for
2 Montrose's performance of an Engineering Evaluation/Cost Analysis
3 ("EE/CA") to evaluate removal action alternatives in the Sanitary
4 Sewers immediately adjacent to and downstream from the Site.
5 Both the FS and the analyses of sanitary sewer conditions were
6 required by the Workplan.

7
8 II. AMENDMENTS

9 A. Article I of the Consent Order, entitled "Jurisdiction,"
10 is amended by deleting the single paragraph in that Article and
11 adding the following:

12 "This Consent Order is entered into pursuant to the
13 authority vested in the President of the United States
14 by Sections 106 and 122 of the Comprehensive Environmen-
15 tal Response, Compensation, and Liability Act of 1980
16 (as amended by the Superfund Amendments and Reauthoriza-
17 tion Act of 1986) ("CERCLA"), 42 U.S.C. §§ 106 and 122.
18 The President delegated this authority to the Ad-
19 ministrator of the United States Environmental Protec-
20 tion Agency ("EPA" or "Agency") by Executive Order
21 12580, 52 Fed. Reg. 2923, and further delegated to the
22 Assistant Administrator for Solid Waste and Emergency
23 Response and the Regional Administrators by EPA Delega-
24 tion Nos. 14-8-A and 14-14-C. This authority has been
25 redelegated to the Director, Hazardous Waste Management
26 Division, EPA, Region 9.

27 Montrose agrees to undertake all actions required
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1 by the terms and conditions of this Consent Order.

2 Montrose consents to and does not contest EPA jurisdic-
3 tion regarding this Second Amended Order."

4 B. Article II of the Consent Order, entitled "Statement of
5 Purpose," is amended by adding the following:

6 "In entering into the Second Amended Order, the
7 mutual objectives of EPA and Montrose are:

8 1. To conduct an Engineering Evaluation/Cost
9 Analysis ("EE/CA") to evaluate removal action alterna-
10 tives for sediments containing DDT from the J.O. "D"
11 sewer interceptors leading from the Site between D-32
12 and A-468 manholes. The EE/CA Work Plan, which is at-
13 tached as Appendix B to this Second Amended Order and
14 incorporated herein by reference, specifies work to be
15 performed as part of the evaluation. The EE/CA Work
16 Plan also includes a list of reports and other
17 deliverables that Montrose will provide for EPA review,
18 comment and/or approval.

19 2. To conduct the overall FS for evaluating
20 remedial action alternatives to prevent or minimize the
21 release or threatened release of hazardous substances,
22 pollutants, or contaminants at or from the Site in a
23 manner consistent with the National Contingency Plan
24 ("NCP"). The FS Work Plan was developed by EPA pursuant
25 to the Workplan and specifies work which must be per-
26 formed as part of the FS. The FS Work Plan also in-
27 cludes a list of reports, documents, and other
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1 deliverables that Montrose will provide for EPA review,
2 comment and/or approval. The FS Work Plan is attached
3 as Appendix C to this Second Amended Order and incor-
4 porated herein by reference.

5 3. To amend the format of and the schedule for
6 preparation of the RIW report, as set forth in Sections
7 II.F. and II. G. of this Second Amended Order.

8 4. To undertake all actions required by the terms
9 and conditions of this Second Amended Order in a cost
10 effective manner in accordance with the provisions of
11 SARA and the National Contingency Plan ("NCP"), 40
12 C.F.R. Part 300.61 et seq., as amended."

13 C. Section III.A. of the Consent Order, entitled
14 "Background" is amended by adding the following:

15 "8. Until approximately 1970, Montrose discharged
16 process wastewater from the Site into two interceptors
17 of the Los Angeles County Sanitation District ("LACSD")
18 sanitary sewer system. Based on information collected
19 by the LACSD, sections of J.O. "D" and District 5 sewer
20 interceptors from the immediate vicinity of the Montrose
21 Site and downstream to the Los Angeles County Joint
22 Water Pollution Control Plant ("JWPCP") have been shown
23 to contain sediments contaminated with DDT.

24 9. Samplings of the sewage and sewer sediments in
25 both J.O. "D" and District 5 interceptors were conducted
26 in 1970, 1971, 1972, 1973, 1976, and 1985 by the LACSD.
27 Sediment samples showed that concentrations of DDT in
28

1 the sewer sediments ranged from 0.4 to 24 percent by
2 weight. The DDT contaminated sewer sediments have been
3 suspected by the LACSD as a source of DDT to the sewage
4 that flows over these sediments. This sewage is treated
5 at the JWPCP and is ultimately discharged to ocean
6 waters through the LACSD Whites Point outfall.

7 10. In 1987, the LACSD announced plans to
8 rehabilitate sewer lines including those that have been
9 suspected as containing DDT contaminated sediments. The
10 J.O. "D" line, Unit 1C between manholes D-157 through
11 D-8, and manholes D-25 through A-479, as well as the
12 District 5 Interceptor between manholes D-150 through
13 D-14, and D-14 through A-479 are severely corroded and,
14 consequently, structurally unsound.

15 11. In September 1988, Montrose, at the request of
16 EPA, conducted an investigation of the sewer intercep-
17 tors in the vicinity of the site pursuant to a Sampling
18 and Analysis Plan and Quality Assurance Project Plan
19 developed by EPA in accordance with the Workplan."

20 D. Section III.B. of the Consent Order, entitled
21 "Determinations", is amended by deleting "§101(14)" on page 5,
22 line 15 and substituting "§106(a)" in its place; by deleting
23 "§9601(14)" on page 5, line 16 and substituting "§9606(a)" in its
24 place; and by adding the following:

25 "5. Montrose is a "person" as defined in Section
26 101 (21) of CERCLA, 42 U.S.C. § 9601 (21).

27 6. Certain of the chemicals, and their con-
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1 stituents, which were used at the site to manufacture
2 and process DDT are "hazardous substances" as defined in
3 Section 101 (14) of CERCLA, 42 U.S.C. § 9601(14).

4 7. Montrose is a potentially responsible party
5 pursuant to Section 107(a) of CERCLA, 42 U.S.C. §
6 9607(a).

7 8. The work performed to date by Montrose on its
8 RIW and sewer sampling program were necessary costs of
9 response which were incurred by Montrose in a manner
10 consistent with the NCP."

11 E. Article IV of the Consent Order, entitled "Work to be
12 Performed", is amended by deleting "Remedial Investigative" from
13 the title of Section IV.J. on page 10, line 6, and by adding the
14 following:

15 "L. Performance of Sanitary Sewer EE/CA

16 Montrose shall perform the tasks and submit reports
17 contained in the EE/CA Work Plan (Appendix B). The list
18 of deliverables and schedule for submittal is contained
19 in the EE/CA Work Plan. Open discussions between
20 Montrose and EPA will be necessary to assure that
21 deliverables contain sufficient detail. Any reports,
22 plans, specifications, schedules, and attachments re-
23 quired by this Consent Order are, upon approval by EPA,
24 incorporated into this Consent Order. The provisions of
25 the EE/CA Work Plan (Appendix B) are not subject to Dis-
26 pute Resolution (Article X) procedures.

27 M. Feasibility Study

1 Montrose shall perform the tasks and submit the
2 reports contained in the FS Work Plan (Appendix C). EPA
3 will perform certain tasks as described in Appendix C.
4 The FS work shall be consistent with all applicable re-
5 quirements of CERCLA and the NCP, and shall be conducted
6 in accordance with EPA Guidance entitled "Guidance for
7 Conducting Remedial Investigations and Feasibility
8 Studies Under CERCLA," October, 1988, and with the stan-
9 dards, specifications, and schedule contained in the FS
10 Work Plan. The provisions of the FS Work Plan (Appendix
11 C) are not subject to Dispute Resolution (Article X)
12 procedures.

13 N. Resubmittal/Revision Schedule

14 1. EPA shall notify Montrose in writing of
15 EPA's approval or disapproval of Montrose's submittals
16 pursuant to the Second Amended Order. In the event of
17 any disapproval, EPA shall specify the reasons for such
18 disapproval and recommended modifications. Montrose
19 shall submit a revised deliverable incorporating EPA's
20 comments in accordance with the schedules contained in
21 Appendices B and C. If EPA submits an additional set of
22 comments on a revised deliverable which requires a third
23 or subsequent draft, Montrose shall submit the final
24 deliverable which incorporates EPA's comments within
25 fifteen (15) days of receipt of EPA's additional com-
26 ments.

27 2. Montrose may begin dispute resolution pro-
28

cedures pursuant to Article X (Dispute Resolution), if appropriate, after it receives EPA's approval or disapproval of the amended deliverable."

F. Section IV.A. of Appendix A is amended by modifying the last sentence to read as follows:

"The RIW report shall be prepared in accordance with the EPA guidance entitled, Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA, October 1988."

G. Section IV.B. of Appendix A is amended by deleting subsections 1) and 3) and substituting the following in their place:

"1) Draft Report: Montrose shall prepare and submit a draft RIW report within 120 days of written notification by EPA that the RIW has been substantially completed.

3) Technical Meeting and Final Report: Montrose shall prepare and submit a final RIW report that incorporates EPA's comments or changes within forty-five (45) days of receipt of EPA's comments on the draft RIW report. EPA and Montrose may have a technical meeting at any point after Montrose's receipt of EPA's comments to discuss such comments."

H. Paragraph IV.I.(1) of the Consent Order, entitled "Submittals", is modified by deleting the block address to "Mr. Angelo Bellomo" and adding the following block address:

"Mr. John J. Kearns
Chief, Long Beach Section
Toxic Substances Control Division
California Department of Health Services
245 W. Broadway, #350
Long Beach, CA 90802"

1 I. Paragraph IV.I.(2) of the Consent Order, entitled
2 "Submittals", is modified by deleting "Mr. Edward Nemecek" and
3 substituting "Mr. David Hargis" in his place, and by deleting the
4 block address to "Mr. Samuel Rotrosen, President" and substitut-
5 ing the following block address:

6 "Daniel M. Greeno, General Manager
7 Montrose Chemical Company of California
8 P.O. Box 0898
Nyala Farms Road
Westport, Connecticut 06881-0898"

9 J. Section IV.K. of the Consent Order, entitled "Additional
10 Remedial Investigation Work," is amended by deleting the word
11 "Remedial" from the title on page 12, line 3, by adding "and
12 Evaluation" to the title after the word "Investigation" on page
13 12, line 3, and by deleting the two paragraphs of this section
14 and adding the following in their place:

15 "After evaluating information collected during im-
16 plementation of Appendices A, B, and C, EPA may deter-
17 mine that additional tasks are needed to accomplish the
18 objectives of the RIW, the EE/CA, or the FS. This addi-
19 tional work shall be limited to investigative work
20 and/or engineering evaluation of remedial options for
21 hazardous substances which are reasonably related to
22 Montrose's activities at the Site. EPA may request that
23 Montrose perform this work in addition to that required
24 by Appendices A, B, and C, including any approved
25 modifications, if EPA determines that such work is
26 necessary and that Montrose can carry out such work
27 properly and promptly. Subject to Dispute Resolution
28

1 (Article X) procedures, Montrose shall implement the ad-
2 ditional investigative work or engineering evaluation
3 which EPA determines is necessary, provided, however,
4 that Montrose may decline to undertake any investigation
5 of hazardous substances in residences and other business
6 locations in the vicinity on the Site. The additional
7 work shall be completed according to the standards,
8 specifications, and schedule set forth by EPA in any
9 modification of Appendices A, B, or C."

10 K. Article VIII of the Consent Order, entitled "Sampling,
11 Access, and Data/Document Availability," is amended by adding
12 "and work required by the Second Amended Order," after "Work" on
13 page 15, line 8, and by deleting "Appendix A" on page 15, line 9
14 and substituting "Appendices A, B, and C. All data generated by
15 sampling required by Appendices B and C shall be submitted to EPA
16 pursuant to the schedule set forth in Paragraph II.B. of Appendix
17 A."

18 L. Article IX, entitled "Record Preservation," is amended
19 by deleting the single paragraph in that article and substituting
20 the following:

21 "Montrose and EPA shall preserve and retain and
22 shall instruct their contractors, subcontractors and
23 anyone else acting on their behalf to preserve and
24 retain all records and documents (in the form of
25 originals or exact copies or, in the alternative,
26 micrographic or electronic data storage of all
27 originals) which relate in any way to the Site, regard-

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1 less of any document retention policy to the contrary,
2 for six years after the termination of this Consent Or-
3 der. After this six year period, Montrose shall notify
4 EPA within thirty (30) days prior to the destruction of
5 any such documents. Additionally, if EPA requests that
6 some or all documents be preserved for a longer period
7 of time, and establishes a reasonable basis for that re-
8 quest, Montrose shall comply with that request.

9 The requirement for preservation and retention of
10 records and documents shall not apply to drafts (other
11 than those referred to by name in this Consent Order and
12 appendices attached hereto), including any handwritten
13 notes or comments, or telephone message slips, except
14 any such draft or telephone message slip that contains
15 data relevant to the Site that is not otherwise being
16 preserved under this Consent Order. Nothing in this ar-
17 ticle may be construed as a waiver of any claims of con-
18 fidentiality or privilege."

19 M. Section X.B. of the Consent Order, entitled "Informal
20 Conference," is amended by deleting "Toxics and" on page 19, line
21 2, and substituting "Hazardous" in its place, and by adding the
22 following to the end of the section:

23 5. Neither these dispute resolution provisions nor
24 EPA's decision(s) pursuant to these provisions grant or
25 imply jurisdiction to any court to review EPA's
26 decision(s) pursuant to this Consent Order beyond that
27 which is currently granted by federal law.
28

1 N. Article XI, entitled "Delay in Performance/Stipulated
2 Penalties," is amended by deleting "Toxics and" on page 20, line
3 13, and page 21, line 2, and substituting "Hazardous" in both
4 places; by deleting "Appendix A" on page 20, lines 16-17 and sub-
5 stituting "Appendices A, B, and C, or future work schedules
6 agreed to by Montrose and EPA,"; by deleting "371003M" on page
7 21, line 4, and substituting in its place "360863"; by adding to
8 the paragraph which ends on page 21, line 5 "Montrose shall send
9 a notification of any penalty paid and a copy of the check to the
10 EPA Project Coordinator."; and by adding the following before the
11 paragraph beginning on page 21, line 1:

12 "For terms and requirements added to this Consent Order
13 by the Second Amended Order, penalties may be assessed
14 in an amount not to exceed the daily rates specified
15 below. Category A noncompliance events shall include,
16 along with those listed in Appendix C, all other
17 failures to comply in a timely or adequate manner with
18 terms and requirements added to this Consent Order by
19 the Second Amended Order. Category B and C noncom-
20 pliance events shall include those listed in Appendix B
21 at Section 4 and Appendix C at Section 7. Category A
22 penalties shall accrue starting five (5) days after
23 Montrose's receipt of notice from EPA that Montrose has
24 failed to meet a Category A requirement. Penalties at-
25 taching to each category are as follows:

	Period of Failure to Comply	Penalty Per Day of Violation		
		Category A	Category B	Category C
	1st through 5th day	\$500	\$2,000	\$5,000
	6th through 30th day	\$2,000	\$5,000	\$10,000
	after 30 days	\$10,000	\$12,000	\$20,000"

O. Article XII of the Consent Order, entitled "Reservation of Rights," is amended by deleting "Appendix A" on page 22 both at lines 5-6 and line 15 and substituting "Appendices A, B, and C" in both places, and by deleting "declines" on page 22, line 7 and substituting "fails" in its place.

P. Article XVI of the Consent Order, entitled "Indemnification of the United States Government" is amended by deleting the single paragraph in that Article starting on page 24, line 7 and substituting in its place the following:

"Montrose agrees to indemnify and hold the United States Government, its agencies, departments, agents, and employees, harmless from any and all claims or causes of action arising from or on account of acts or omissions of Montrose, its officers, employees, receivers, trustees, agents, or assigns, in carrying out the activities pursuant to this Second Amended Order. EPA is not a party in any contract involving Montrose at the Site."

Q. Article XXI of the Consent Order, entitled "Notice to the Parties" is amended by deleting "Lisa Haage" and substituting "Allan G. Zabel" in her place, by deleting "Harry Seraydarian" and substituting "Jeff Zelikson" in his place, by deleting

1 "Toxics and" and substituting "Hazardous" in its place, and by
2 deleting "Mr. Edward Nemecek" and substituting "Mr. David Hargis"
3 in his place.

4 R. The Consent Order is amended by adding the following as
5 Article XXIII:

6 "XXIII. REIMBURSEMENT OF FUTURE OVERSIGHT COSTS

7 Montrose shall reimburse the Hazardous Substances
8 Superfund for future oversight costs, including EPA's
9 indirect costs, incurred by EPA subsequent to the first
10 full month after the effective date of this Second
11 Amended Order. These oversight costs shall be incurred
12 by EPA in a manner not inconsistent with the NCP in
13 overseeing and reviewing the work of Montrose under this
14 Consent Order. At the end of each calendar quarter, EPA
15 shall submit to Montrose and accounting of all oversight
16 costs based on Region IX accounting documentation. This
17 accounting shall include a copy of the appropriate SPUR
18 (Software Package for Unique Reports, EPA's Superfund
19 accounting system document), which provides an account-
20 ing of EPA's direct costs, and a summary accounting of
21 EPA's indirect cost calculations. EPA will submit to
22 Montrose, no more than annually, an accounting of all
23 oversight costs expended during the past calendar year
24 based on accounting documentation from EPA headquarters.
25 Failure to include all relevant oversight costs in the
26 submittal at the end of any particular annual accounting
27 will not preclude the EPA from seeking such costs in any
28

1 subsequent year, up to six (6) years subsequent to EPA's
2 incurrence of such costs.

3 Montrose shall, within thirty (30) calendar days of
4 receipt of each accounting, remit a check for the amount
5 of those costs made payable to the Hazardous Substance
6 Response Trust Fund. Any payment made by Montrose pur-
7 suant to this Article shall not constitute an admission
8 of liability by Montrose to EPA or any other person or
9 entity. Checks should specifically reference the iden-
10 tity of the Site and be addressed to:

11 U.S. Environmental Protection Agency - Region 9
12 Attn: Superfund Accounting
13 P.O. Box 360863
Pittsburgh, PA 15251

14 A copy of the transmittal letter shall be sent
15 simultaneously to the EPA Project Coordinator.

16 EPA reserves the right to bring an action against
17 Montrose pursuant to Section 107 of CERCLA, 42 U.S.C. §
18 9607, for recovery of all response and oversight costs
19 incurred by the United States related to this Second
20 Amended Order and not reimbursed by Montrose, as well as
21 any other unreimbursed past and future costs incurred by
22 the United States in connection with response activities
23 conducted pursuant to CERCLA at the Site.

24 Montrose reserves the right to contest, through the
25 Dispute Resolution process set out in Article X, that
26 EPA's annual accounting includes claims for costs not
27 actually incurred or incurred in a manner inconsistent
28

1 with the NCP. If Montrose chooses to raise any such
2 dispute, Montrose must do so within one calendar year of
3 EPA's original request for payment of such costs.

4 Should it be determined in Dispute Resolution that
5 Montrose has overpaid EPA oversight costs, Montrose
6 shall receive the amount overpaid as a credit toward
7 payment of subsequent EPA oversight costs.

8 Montrose reserves its right to seek reimbursement
9 under Section 106(b)(2) of CERCLA, 42 U.S.C. §
10 9606(b)(2), for its payment of oversight costs to EPA
11 where: Montrose has disputed those costs within one
12 calendar year of EPA's original request for payment of
13 those costs; Montrose's dispute of those costs has been
14 rejected in Dispute Resolution; and Montrose has com-
15 pleted all requirements under the Second Amended Order.
16 This right to seek reimbursement is limited to
17 Montrose's payment of EPA's oversight costs and does not
18 affect Montrose's waiver, set forth in Article XXVII, of
19 its right to seek reimbursement for costs incurred by
20 Montrose in carrying out all other requirements on the
21 Second Amended Order."

22 S. The Consent Order is amended by adding the following as
23 Article XXIV:

24 "XXIV. COMMUNITY RELATIONS/PUBLIC COMMENT

25 EPA will implement a Community Relations Program in
26 accordance with Agency policies and guidance documents.
27 Montrose may participate in the community relations ac-

1 tivities when deemed appropriate by EPA."

2 T. The Consent Order is amended by adding the following as
3 Article XXV:

4 "XXV. EFFECTIVE DATE AND SUBSEQUENT MODIFICATION

5 A. The Second Amended Order is effective on the
6 date signed by EPA.

7 B. No informal advice, guidance, suggestions, or
8 comments by EPA regarding reports, plans, specifica-
9 tions, schedules, and any other writing submitted by
10 Montrose will be construed as relieving Montrose of its
11 obligation to obtain such formal approval as may be re-
12 quired by this Second Amended Order."

13 U. The Consent Order is amended by adding the following as
14 Article XXVI:

15 "XXVI. NOTICE TO THE STATE

16 EPA has notified the State of California of the
17 Second Amended Order pursuant to the requirements of
18 Section 106(a) of CERCLA, 42 U.S.C. § 9606(a)."

19 V. The Consent Order is amended by adding the following as
20 Article XXVII:

21 "XXVII. CLAIMS AGAINST THE FUND

22 In consideration of the entry of this Second
23 Amended Order and except as set forth in Article XXIII,
24 Montrose agrees not to make any claims pursuant to Sec-
25 tion 112 or Section 106(b)(2) of CERCLA, 42 U.S.C.
26 9612, 9606(b)(2), or any other provision of law directly
27 or indirectly against the Hazardous Substance Superfund

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1 or make other claims against the EPA for those costs ex-
2 pended pursuant to this Second Amended Order."

3 W. The Consent Order is amended by adding the following as
4 Article XXVIII:

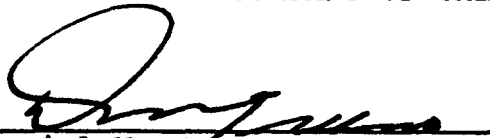
5 "XXVIII. TERMINATION AND SATISFACTION

6 The provisions of the Second Amended Order shall be
7 deemed satisfied upon Montrose's receipt of written
8 notice from EPA that Montrose has demonstrated, to the
9 satisfaction of EPA, that all of the terms of this
10 Second Amended Order, including those specified in Ap-
11 pendices B and C, have been completed."

12 IT IS SO AGREED AND ORDERED:

13 MONTROSE CHEMICAL COMPANY OF CALIFORNIA

14
15 By:



16 Daniel M. Greeno
17 General Manager
Montrose Chemical Company
of California

Date:

7/6/89

18
19 UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

20
21 By:


22 Jeff Zelickson
23 Director
Hazardous Waste Division
24 United States Environmental
Protection Agency, Region 9

Date:

7-11-89

Appendix B

WORK PLAN ENGINEERING EVALUATION/COST ANALYSIS FOR A REMOVAL ACTION

Montrose Chemical Sanitary Sewers

June 1989

INTRODUCTION

The purpose of this work plan is to provide the objectives and a detailed approach for conducting the Engineering Evaluation/Cost Analysis ("EE/CA") for a potential removal action at the Montrose Chemical Company Superfund Site. A brief summary of the background information related to the Montrose Chemical Sanitary Sewers sampling is also provided as well as a schedule for deliverables and review meetings.

An EE/CA is a comparative analysis of removal action options for a Superfund site, which is conducted in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980, the Superfund Amendments and Reauthorization Act of 1986, the National Oil and Hazardous Substances Contingency Plan, and U.S. EPA OSWER Directive 9360.0-15 (April 27, 1987). The EE/CA Report is required for any removal where a planning period of at least six months exists before removal activities are initiated, and the EE/CA serves as a focused feasibility study of removal action alternatives. Under EPA's Workplan for the Site, EPA intended for such alternatives to be evaluated in the overall Feasibility Study (FS) for

the site but has since determined that an earlier, focussed FS of this nature is appropriate and necessary since the Los Angeles County Sanitation District (LACSD) is in the process of repairing sewer lines in the vicinity of the Site.

BACKGROUND INFORMATION

In 1946, the Montrose Chemical Corporation of California (Montrose) began manufacturing dichlorodiphenyl-trichloroethane (DDT) at 20201 South Normandie Avenue (the Site), within the incorporated boundaries of the County and City of Los Angeles between the cities of Torrance and Carson. Montrose reportedly discharged process wastewater containing DDT from the facility into two interceptors of the Los Angeles County Sanitation Districts (LACSD) sanitary sewer system until 1970. The two sewer lines are referred to as the J.O. "D" line and District 5 Interceptor. Raw sewage from the region around the Site is carried downstream to the Los Angeles County Joint Water Pollution Control Plant (JWPCP). JWPCP treated effluent is ultimately discharged to ocean waters through the LACSD Whites Sands outfall.

Sampling of the sewage and sewer sediments in both the J.O. "D" and District 5 Interceptors were conducted in 1970, 1971, 1973, 1976, and 1985 by the LACSD. The sewer sediment samples have shown DDT concentrations of 0.4 to 24 percent in the interceptors pipe segments. The highest

concentrations were found in tar sediments in the J.O. "D" line adjacent to the Site. These DDT contaminated sewer sediments have been suspected by the LACSD as being the primary source of DDT in the sewage that is treated at the JWPCP.

In 1987, the LACSD announced plans to rehabilitate those portions of the sewer interceptor pipelines in their system that are severely corroded and structurally unsound. Some of the sewer interceptors requiring rehabilitation had been reported to contain DDT contaminated sediments (J.O. "D" and District 5). Based on the LACSD data, the EPA determined that the DDT contaminated sewer sediments deposited in the LACSD interceptor pipes may represent an actual and/or threatened release of hazardous substances, and that the circumstances required response actions under CERCLA.

The EPA developed a Field Sampling Plan and a Quality Assurance Project Plan to provide current site-specific data and analyses of these data, on the nature and extent of contamination in the portion of the LACSD sewage collection system from the vicinity of the Site to the JWPCP (an approximate distance of 20,000 lineal feet in each of the interceptors). The specific objectives of the field sampling were to: (1) provide data for quantitative estimates of the distribution of sewer sediments contaminated with DDT and metabolites, from the vicinity of the Site to the JWPCP; (2) provide data to develop estimates of the release rate, mobility and fate of DDT in the sewer sediments and sewage; (3) provide chemical and physical data on the contaminated sewer sediments for the evaluation of remedial alternatives; (4)

provide data for the evaluation of public health and environmental effects of the DDT sources and releases; and (5) provide a Data Evaluation Report to include all data collected and an evaluation and summarization of those data. EPA requested Montrose to assume responsibility for conducting the Sewer Field Sampling according to the EPA developed Field Sampling Plan and Quality Assurance Project Plan, and would have implemented that Plan and sought cost recovery from Montrose had it not complied with that request. The field sampling was completed between August 23rd and September 9th, 1988 by consultants working for Montrose.

The investigation revealed that tar sediments in the J.O. "D" line adjacent to the Site contained 97 percent of the DDT that was found in the sewer. The tar was in a sewer segment (approximately 2,200 feet long) between manholes D27 and D31. This sewer line segment is not scheduled for repair by the LACSD.

OBJECTIVES OF THE EE/CA

The EE/CA is required to document the analysis of removal alternatives. The specific objectives of the EE/CA are as follows: (1) to provide an analysis of removal technologies and alternatives which is consistent with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 ("CERCLA"), the Superfund Amendments and Reauthorization Act of 1986 ("SARA"), the National Oil and Hazardous Substances Contingency Plan ("NCP"), and U.S. EPA policy entitled, "The Role of Expedited Response Actions under SARA" (OSWER Directive 9360.0-15, April 27, 1987) and "Expedited Response Actions" (OSWER Directive 9360.0-10, July 8, 1986), and compatible with the sewer rehabilitation plans of the LACSD; (2) to provide a document which fulfills the U.S. EPA policy entitled, "Environmental Review Requirements for Removal Actions" (OSWER Directive 9318.0-05, April 13, 1987); and (3) to provide clear documentation of the analysis of field data, review and selection of technologies, and the development and screening of removal action alternatives.

SCOPE OF WORK: ENGINEERING EVALUATION/COST ANALYSIS (EE/CA)

The following sections provide specific details on the EE/CA Report format, on the approach and content of the EE/CA Report, and on the required deliverables and technical meetings.

Section 1: REPORT FORMAT

The EE/CA Report shall be developed in accordance with the following format and include all of these elements. It may prove necessary to include appendices of analytical results and other supporting materials.

INTRODUCTION

SITE CHARACTERIZATION

- A. Site Description**
- B. Site Background**
- C. Analytical Data**
- D. Conditions That Require an EE/CA**

IDENTIFICATION OF REMOVAL ACTION OBJECTIVES

- A. Environmental and Human Health Objectives**
- B. Removal Schedule Objectives**
- C. Applicable or Relevant and Appropriate Requirements**

IDENTIFICATION OF REMOVAL ACTION ALTERNATIVES

[Subsection for each alternative]

ANALYSIS OF REMOVAL ALTERNATIVES

[Subsection for each alternative with these elements]

A. Effectiveness

1. Protectiveness

- a) Protection of Community During Removal
- b) Protection of Workers During Removal
- c) Threat Reduction
- d) Time Until Protection Achieved
- e) Compliance with ARARs
- f) Consideration of other
Criteria, Advisories, and Guidances
- g) Environmental Impacts
- h) Potential Exposure to Residuals
- i) Long-term Reliability

2. Use of Alternatives to Land Disposal

B. Implementability

1. Technical Feasibility

- a) Ability to Construct/Operate Technology
- b) Compliance with Action-specific ARARs
- c) Ability to Meet Performance Goals
- d) Demonstrated Performance
- e) Environmental Conditions
- f) Compliance with SARA

2. Availability

- a) Equipment/Materials/Personnel**
- b) Off-site Treatment/Storage/Disposal**
- c) Post-Removal Site Control**

3. Administrative Feasibility

C. Cost of Alternative

COMPARATIVE ANALYSIS OF REMOVAL ACTION ALTERNATIVES

- A. Effectiveness**
- B. Implementability**
- C. Cost**

PROPOSED REMOVAL ACTION

The EE/CA is a summary document and is limited in scope to evaluating removal action alternatives. Accordingly, the EE/CA is not comparable in detail or scope to a CERCLA-type Feasibility Study.

Section 2: SPECIFIC TASKS

TASK 1: Prepare EE/CA Workplan

EE/CA Report Work Plan: Within 45 days of the effective date of this amendment, Montrose shall submit to EPA for review and approval a Draft EE/CA Work Plan in the form of a brief letter report that includes at a minimum (1) an annotated EE/CA Report outline; (2) the removal action objectives; and (3) a schedule for submittal of the Draft EE/CA report. Montrose shall submit a Final EE/CA Work Plan in the form of a brief letter report to EPA for approval within 14 days of receipt of EPA comments on the Draft EE/CA Work Plan.

TASK 2: Prepare EE/CA Report

The subtasks associated with the development of the EE/CA Report are presented according to the headings of the report format. Additional guidance for the development and screening of removal alternatives may be found in the following EPA documents: Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA (October 1988). and Interim Guidance on Compliance with Applicable or Relevant and Appropriate Requirements (OSWER Directive 9234.0-05, July 9, 1987).

Subtask 1: Introduction

The introduction should present an overview of the project scope and objectives.

Subtask 2: Site Characterization

A detailed and concise description of the Site should be provided in this section of the report as it relates to the contamination in the sanitary sewer interceptors. The EPA Field Sampling Plan and subsequent Data Evaluation Report should provide the necessary information concerning the sanitary sewers characteristics. The site characterization section should include the following information:

A. Site Description

Provide information on the project location, the layout of the LACSD sanitary sewer interceptors from near the Site to the JWPCP and the land uses immediately along the pathways of the J.O. D and District 5 interceptors pipelines. Identify pipelines, conduits, and other structures which transect the sewer interceptor pathways.

B. Site Background

Provide information on the operational history of the Site, history of sewer interceptor installations (J.O. D and District 5 interceptors), and regulatory actions and involvement.

C. Analytical Data

Provide a detailed and concise summary of the results of all analytical data, including data collected by the EPA and LACSD. Extensive data tables may be included in an appendix. Sample collection methods and analytical methods should either be presented in an appendix or the separate field data report may be referenced.

D. Conditions That Require an EE/CA

The discussion of the analytical data should be focused to identify specific sections of the sewer interceptors that are the subject of this EE/CA report. The level of DDT contamination in the sections of the J.O. D and District 5 interceptors and the physical conditions of these sewer sediments shall be identified, to the extent possible with the analytical data available. Sections of the J.O. D and District 5 interceptors which require rehabilitation due to sewer pipe deterioration shall be identified based on information provided by the LACSD.

TASK 3: Identification of Removal Action Objectives

A. Environmental and Human Health Objectives

The specific environmental and human health objectives should be delineated for the sanitary sewers removal action. The lineal feet of sewers determined to be contaminated in the preceding analysis defines the scope of the potential removal action. Existing releases of DDT (and

potentially other co-occurring contaminants) from the sewer sediments shall be discussed, including the concentrations and mass emissions of DDT to the LACSD JWPCP, and the partitioning and ultimate fate of the DDT in sludge or effluent. Potential releases of DDT from the sewer sediments shall be discussed, including mechanisms of release from the cracking or collapse of sewer pipes, and disturbance from sewer rehabilitation activities.

B. Removal Schedule Objectives

The scheduling of the removal action shall be coordinated with the LACSD sewer rehabilitation activities.

C. Applicable or Relevant and Appropriate Requirements ("ARARs")

The chemical-specific, action-specific, and location-specific Federal and State ARARs shall be identified. In addition, other criteria, advisories, and guidances (Federal, State, regional, or otherwise) that may be appropriately applied to the site or removal action shall be identified. This task will require coordination, at a minimum, with EPA and Los Angeles Regional Water Quality Control Board ("LARWQCB").

TASK 4: Identification of Removal Action Alternatives

The identification of removal action alternatives shall include screening of technologies, justification of technologies selected, assemblage of technologies into feasible removal action alternatives, screening of alternatives (only if necessary to reduce the number of

alternatives analyzed in detail), and justification for eliminating alternatives. The removal action alternatives to be evaluated under Task 5 shall include the following:

1) No Action

This alternative would require no action except for periodic monitoring to assure continued protection of human health and the environment.

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2) In Situ Containment

This alternative may consist of the application of one or several technologies to the interior of the contaminated sewer pipe sections including; synthetic lining (with high density polyethylene, or other materials), capping (with chemical sealant, concrete, etc.), fixation (with inorganic or organic materials), and chemical stabilization. This alternative will examine two scenarios. The first scenario will reflect 1989 conditions wherein excess capacity does not exist in the sewer. The second scenario will reflect a hypothetical future condition when adequate excess capacity exists to allow by-passing of the present sewer line.

3) Removal and Treatment

This alternative consists of physical or chemical removal of contaminated sewer sediments from the sewer interceptors, possible flow diversion measures during removal, and treatment and/or disposal of the contaminated sediments removed from the sewer pipes. This alternative will examine two scenarios. The first scenario will reflect 1989 conditions wherein excess capacity does not exist in the sewer. The second scenario will reflect a hypothetical future condition when adequate excess capacity exists to allow by-passing of the present sewer line.

TASK 5: Analysis of Removal Alternatives

Each removal action alternative identified shall be evaluated based on the following criteria.

A. Effectiveness

1. Protectiveness

a) Protection of Community During Removal

The threats of release and potential human health effects that may result from implementing the removal action alternative shall be described. Quantitative estimates of releases to various environmental media shall be provided, and mitigation measures shall be described.

b) Protection of Workers During Removal

Potential worker exposures to contaminants, which could may result from the removal action shall be described, and mitigative measures shall be described.

c) Threat Reduction

Provide an evaluation of extent to which the completed removal action will eliminate or mitigate existing or threatened releases of contaminants. Provide quantitative estimates of the remaining releases of contaminants, describe the contaminants fate (e.g. sewage effluent or sludge), and

estimate the effects of these releases on human health and/or the environment.

d) Time Until Protection Achieved

Provide estimates of the time until environmental and public health protection will be achieved compared to the removal action schedule.

e) Compliance with ARARs

Provide a determination of whether the identified ARARs can be met using the removal action alternative.

f) Compliance with Criteria, Advisories, and Guidances

Describe whether the removal action will comply with other criteria, advisories, or guidances that are not ARARs, but could be considered appropriately applied to the Site.

g) Environmental Impacts

Provide a description of the potential environmental impacts that may result from implementing the removal action and mitigative measures that can be undertaken.

h) Potential Exposure to Residuals

Provide an assessment of the potential for future exposure to the residual contamination that would remain after the removal action.

i) Long-term Reliability

Provide an assessment of the potential for failure of the removal action alternative and the need for replacement, and describe the potential releases and exposures that could result from such a failure or replacement. This assessment should include the reliability of engineered components, non-engineered components, and institutional controls (e.g. restricted use), as appropriate.

2. Use of Alternatives to Land Disposal

Provide a description of the use of treatment or recycling in the removal action alternative. The removal program policy encourages the use of alternatives to land disposal.

B. Implementability

1. Technical Feasibility

a) Ability to Construct/Operate Technology

Describe the technology(ies) required for the removal alternative, and the necessary components required to construct and operate the technology. Discuss possible and probable difficulties and schedule delays.

b) Compliance with Action-specific ARARs

Describe whether federal and state action-specific ARARs can be met or whether a waiver is appropriate. SARA provides criteria under Section 121(d)(4) which identify the conditions under which an ARAR may be waived.

c) Ability to Meet Performance Goals

Describe the removal action alternatives ability to achieve the process efficiencies or performance goals.

d) Demonstrated Performance

Provide an evaluation of the technology and whether it is proven and has been applied under similar conditions and with similar waste materials.

e) Environmental Conditions

Provide an evaluation of the environmental constraints, if any, to the application of a technology for the removal action alternative (e.g. ambient temperature, rainfall, air quality).

f) Compliance with SARA

Describe how the removal action alternative will comply with SARA requirements that removal actions should contribute to the efficient performance of long-term remedial measures. Describe how the removal action is consistent with the long-term remedy for the Site (i.e. consider particularly the pipe sections which transect the Site).

2. Availability

a) Equipment/Materials/Personnel

Evaluate the availability of necessary equipment, materials, and personnel, and compare any impacts on the removal action schedule.

b) Off-site Treatment/Storage/Disposal

Evaluate the availability of adequate off-site treatment, storage, and disposal capacity, if appropriate.

c) Post-Removal Site Control

Describe any post-removal site control measures that will be required, including monitoring.

3. Administrative Feasibility

Provide an evaluation of public acceptance of the alternative, including State and local concerns, if known. Identify activities which need to be coordinated with agencies, and review the permits necessary for the removal action.

C. Cost of Alternative

Provide a detailed assessment of the total (present worth) cost of the alternative including direct capital costs, indirect capital costs, and post-removal site control costs.

TASK 6: Comparative Analysis of Removal Action Alternatives

After each alternative is summarized individually, a comparative analysis of the advantages and disadvantages of each alternative weighed against those of the other alternatives shall be provided. For the

convenience of review, it is suggested that tables be used to supplement the comparative analysis in the EE/CA Report.

TASK 7: Proposed Removal Action

Provide a concise and detailed presentation of the proposed removal action, the rationale for its selection, and the associated cost estimates.

Section 3: SCHEDULE, DELIVERABLES, AND MEETINGS

The following section defines the schedule for the preparation of the EE/CA Report Work Plan in the form of a brief letter report and identifies required deliverables and review meetings with the EPA. All Draft documents shall be submitted to EPA for review and approval, and all final versions shall incorporate comments and changes required by EPA. The schedule is based on calendar days; if a due date falls on a weekend or federal holiday, the deliverable shall be due on the next working day.

EE/CA Report Work Plan: Within 45 days of the effective date of this amendment, Montrose shall submit to EPA for review and approval a Draft EE/CA Work Plan in the form of a brief letter report that includes at a minimum (1) an annotated EE/CA Report outline; (2) the removal action objectives; and (3) a schedule for submittal of the Draft EE/CA report. Montrose shall submit a Final EE/CA Work Plan in the form of a brief letter report to EPA for approval within 14 days of receipt of EPA comments on the Draft EE/CA Work Plan.

Draft EE/CA Report: Montrose shall submit a Draft EE/CA Report to EPA, the LARWQCB, and LACSD for review in accordance with the approved Work Plan schedule.

Technical Meeting: A meeting between Montrose, EPA, LARWQCB, and the LACSD to discuss written review comments on the Draft EE/CA Report shall be held, as necessary.

Final EE/CA Report: Montrose shall submit to EPA for approval the Final EE/CA report within 45 days of receipt of EPA comments on the Draft EE/CA Report.

Public Comment Period: EPA advertises a twenty-one day public comment period on the EE/CA.

Responsiveness Summary Assistance: Montrose provides assistance to EPA, as needed, to address specific technical issues in the public comments on the EE/CA.

Decision Document: EPA prepares the action memo for approval of the selected removal alternative by the Regional Administrator.

Section 4: STIPULATED PENALTY SCHEDULE

The events constituting Category B and Category C penalties for the purposes of Article XI of the Consent Order are listed below.

Category B Penalties

1. An untimely submittal of the Draft EE/CA Report.

Category C Penalties

1. An untimely or inadequate submittal of the Final EE/CA Report.

Appendix C

FEASIBILITY STUDY WORK PLAN

**MONTROSE CHEMICAL CORPORATION
LOS ANGELES, CALIFORNIA**

June 1989

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Section 1
INTRODUCTION

The purpose of this work plan is to describe the activities necessary to complete the Feasibility Study (FS) which will evaluate alternatives to mitigate contamination related to the Montrose Chemical Corporation facility. The FS will then act as a basis for the remedy decision at the site.

Section 2
OBJECTIVES OF THE FEASIBILITY STUDY

The objectives of the Feasibility Study (FS) for the Montrose facility site are based on the National Contingency Plan (NCP); criteria mandated in CERCLA, as amended by SARA; and the current knowledge of the site; The objectives are:

- . To adhere to the applicable USEPA policies and guidelines as referenced in this Work Plan;
- . To develop a range of treatment alternatives which permanently reduces the volume, toxicity, or mobility of the hazardous substance, pollutant, or contaminant. These alternatives will range from eliminating the need for long-term management at the site to those that would require additional management.
- . To provide an analysis that allows EPA to select a remedy that: (1) attains and complies with federal and state applicable or relevant and appropriate requirements; (2) uses permanent solutions and alternative treatment technologies, or resource recovery technologies, to the maximum extent practicable; (3) is protective of human health and the environment; (4) is a cost-effective remedial action containing elements necessary and sufficient to meet the cleanup objectives.

Section 3 SITE CHARACTERIZATION

BACKGROUND

The Montrose Chemical Corporation manufactured DDT from 1947 to 1982 at a 13-acre site located along Normandie Avenue between the cities of Torrance and Carson (Figure 3-1). A USEPA investigation in 1982 found DDT in surface water run-off and sediments leaving the Montrose property. This resulted in issuance to Montrose of simultaneous enforcement orders by the USEPA and the California Regional Water Quality Control Board (CRWQCB) which required prevention of DDT discharge from the property and plans for remedial action. In 1984, the USEPA proposed the Montrose site for inclusion on the Superfund National Priority List, requiring implementation of a Remedial Investigation/Feasibility Study (RI/FS) in order to select an appropriate remedial action.

SITE DESCRIPTION

The site is located 15 miles south of Los Angeles on the Torrance Plain, a broad, flat coastal floodplain. The climate is mild, with an average annual precipitation of 12.1 inches and average daily temperature range from 55 to 70°F. Winds are typically from the west. Industrial complexes and residential neighborhoods occupy the area around the site.

When operational, the site had consisted of a large central processing area that included the main DDT processing building, a surface impoundment (waste recycling pond), cooling tower, storage areas, lunchroom, and maintenance shop (Figure 3-2). The main offices, laboratory, warehouses, special products plant, and locker rooms were situated in the eastern part of the site.

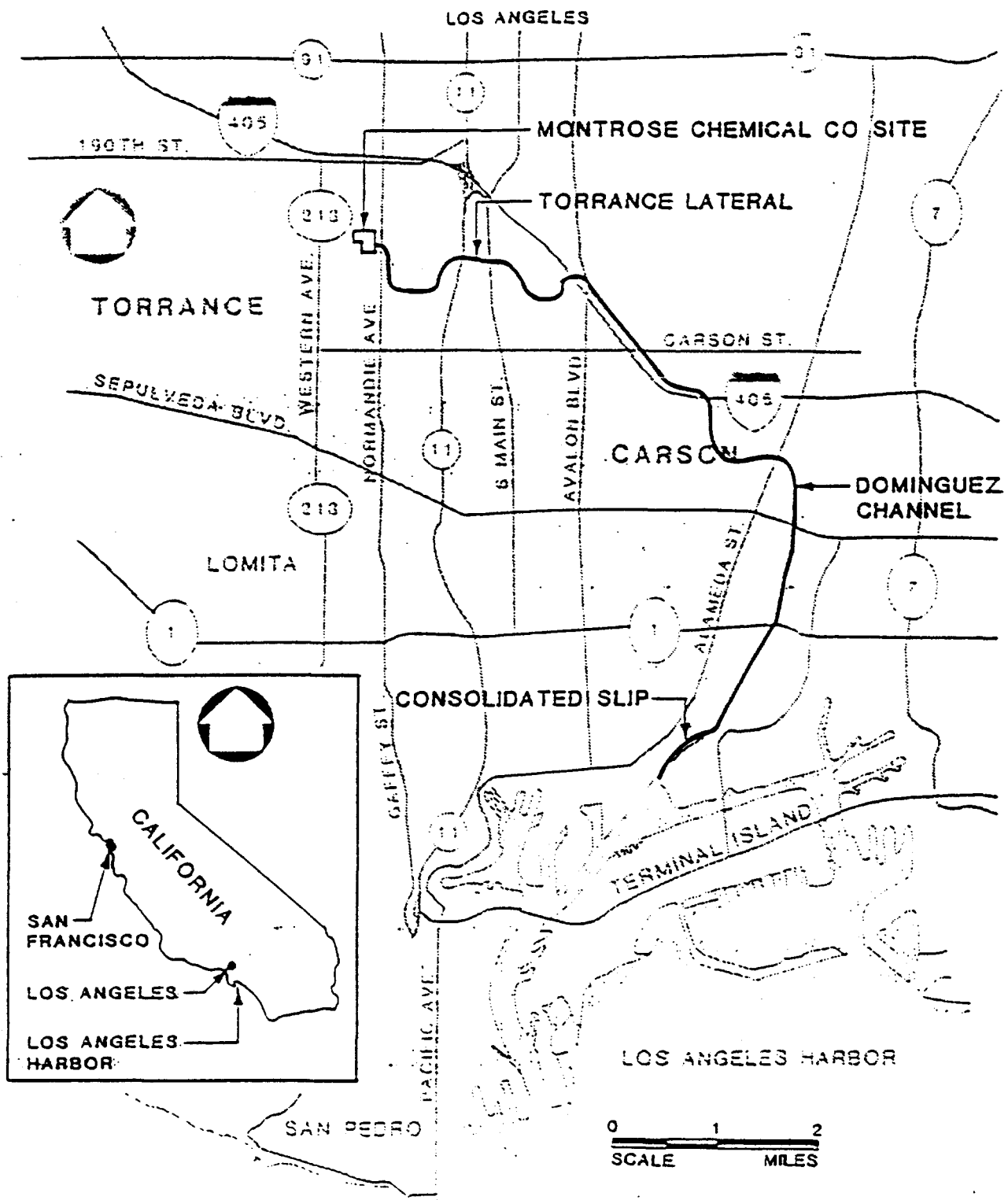
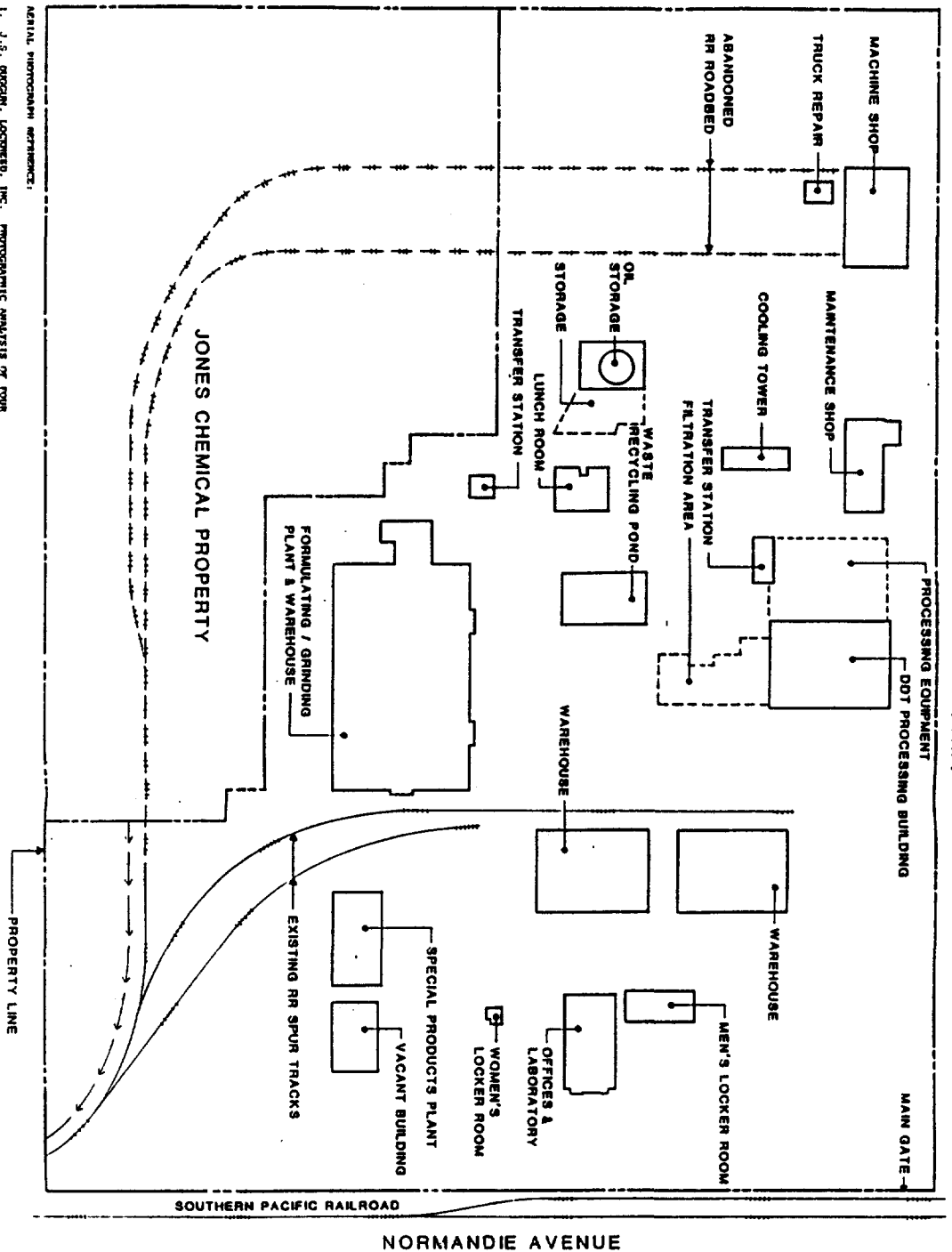


FIGURE 3-1. LOCATION MAP - MONTROSE FACILITY SITE

MC DONNELL DOUGLAS CORP.



0 50 100
SCALE FEET

- AERIAL PHOTOGRAPH REFERENCE:
1. J.S. BUCKLEY, LOCKHEED, INC. PHOTOGRAPHIC ANALYSIS OF FOUR CALIFORNIA HAZARDOUS WASTE SITES (1978-1981). U.S. EPA OFFICE OF RESEARCH AND DEVELOPMENT, MONITORING SYSTEMS LABORATORY, SEPTEMBER 1981.
 2. MONTROSE CHEMICAL CORPORATION OIL SPILL PREVENTION CONTROL AND CORRECTION PLAN (1-3-75).

FIGURE 3-2.
MONTROSE FACILITY PLAN

Storage areas, machine shop, and truck repair facilities were historically situated in the western part of the site, and a large formulating and grinding plant was located in the central and southern portion of the site.

The surface impoundment was reported to have an area of approximately 2,400 square feet and a volume of 2,667 cubic yards (40 feet by 60 feet by 30 feet deep). It received process wastes that overflowed from two underground storage tanks and stormwater run-off from the central process area. Historical drainage paths onsite and offsite have been identified from aerial photographs (Figure 3-3). Storm run-off flowed through onsite drainages to the Normandie Avenue drainage ditch, into a storm drain beneath Kenwood Avenue, and then through the Torrance Lateral, Dominguez Channel, and Consolidated Slip to Los Angeles Harbor (Figure 3-1). Drainage pathways are significant since they tend to collect and distribute chemical contaminants.

SITE HISTORY AND ACTIVITY

Site History

Aerial photographs available from 1946 through 1983 indicate various locations around the site used for storage of unknown materials, either product and/or waste. Investigation of high levels of DDT in the Los Angeles County Sanitation District (LACSD) discharge in the 1970s led to the discovery of high DDT concentrations in the sanitary sewer system at a location close to the Montrose site. The DDT was attributed to mop washwater and employees shaking dust from DDT-contaminated clothes in the locker rooms. However, this source of DDT is not part of the waste stream discharge generated directly by the process activities at the site. Waste stream discharge to the sanitary

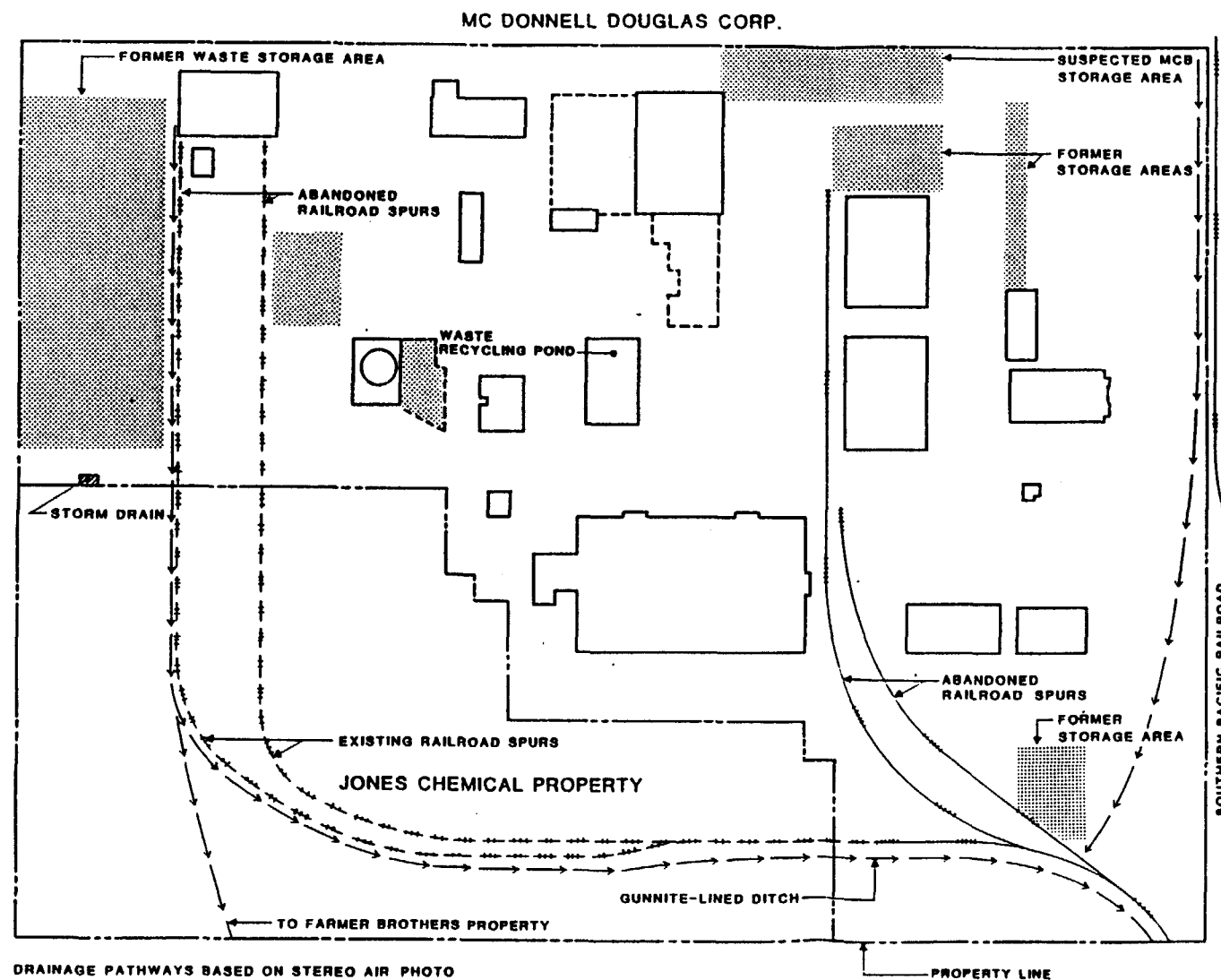


FIGURE 3-3.
HISTORICAL DRAINAGE PATHWAYS

sewer ended in 1972; subsequently, process wastes were hauled offsite. Prior to 1970, the main surface impoundment was unlined and its contents were free to percolate down into the underlying sediments. The impoundment was lined with concrete in 1970 and remained in use until the plant was closed in 1982 when the plant buildings were dismantled. Montrose reports that closure of the pond included removal of sludge and crushing of the concrete pond lining which was subsequently placed in large crushed concrete piles onsite.

Following the USEPA and CRWQCB enforcement orders in 1983, Montrose engaged a consultant to perform an initial site investigation. The sampling program, which included the installation of 31 soil borings, was not carried out under USEPA approved Quality Assurance and Quality Control (QA/QC) Plans. In the summer of 1983, Montrose constructed a berm to prevent stormwater runoff from leaving the site, presented results of the soil sampling program, and submitted plans to construct warehouses and an asphalt cap over the entire site as part of a property redevelopment plan. USEPA reviewed the plans and found them unable to meet RI/FS document requirements since operations would redistribute contamination onsite, and the plan would not be acceptable as a final remedy for the site. In April 1985 Montrose regraded the site, constructed raised building pads, and paved the site with asphalt in an effort to prevent the contamination of surface runoff and infiltration of contaminated stormwater.

During April 1985, Montrose installed five groundwater monitoring wells onsite and drilled one soil boring to a depth of 50 feet at the center of the former surface impoundment. Again, this program was not conducted under approved USEPA Sampling and QA/QC Plans; therefore, the results may only be used as an indication of contaminant distribution.

RI/FS Activities

Based on previous results, EPA determined the necessity of a Remedial Investigation/Feasibility Study (RI/FS) to fully characterize the site and the extent of contamination and to develop potential remedial alternatives. The RI sampling effort is phased so it can be continually scoped to minimize the amount of data and maximize data quality.

The USEPA RI Part 1 field program conducted by Metcalf & Eddy commenced in June 1985. The objectives were to determine (1) the extent of soil contamination; (2) if contaminants from the Montrose site have moved down through the unsaturated soil zone to the groundwater; and, if so (3) to ascertain the direction of groundwater flow, the existence and significance of perched groundwater, and to assess whether it merges with underlying aquifers. RI Part 1 included two rounds of groundwater samples from the onsite wells installed by Montrose, and soil samples from 17 locations onsite. Groundwater samples from two nearby wells offsite and soil samples from two nearby offsite locations were also taken. This work was performed in accordance with USEPA approved Sampling and QA/QC Plans.

The USEPA RI Part 2 field program conducted by Montrose under a Consent Order with EPA commenced in 1986 with two objectives: (1) to better define the extent of soil and groundwater contamination that may have resulted from activities at the Montrose site, and (2) to gather sufficient data to support the current Feasibility Study. The onsite field program included the following:

- . Two exploratory borings drilled to the base of the Gage Aquifer for lithologic logging.
- . Eight monitoring wells, four of which are completed in the Bellflower Aquitard, three in the Upper Gage Aquifer, and one in the Lower Gage Aquifer.

- . Two rounds of water samples from the newly constructed wells and from the five monitoring wells installed in April 1985.
- . Analysis of each water sample for the following Target Chemicals: DDT (all isomers) and metabolites, DDD (all isomers) and DDE (all isomers); benzenehexachloride (BHC), chlorobenzene (MCB), dichlorobenzene (all isomers), chloroform; benzene; and acetone.
- . Four soil borings to a depth of 60 feet in the vicinity of the former surface impoundment, including soil samples collected at 5-ft intervals beginning at 16-ft depth.
- . Analysis of soil samples obtained at 10-ft intervals in the four soil borings for the above listed Target Chemicals.

The offsite field program included the following:

- . Soil samples collected from offsite residential and commercial properties.
- . Sediment and surface water samples collected in Kenwood Drain, Torrance Lateral, Dominguez Channel, and Consolidated Slip.
- . Soil samples collected along transects on nearsite properties and drainageways.
- . Analysis of the above samples for DDT (all isomers), DDD (all isomers), DDE (all isomers), dichlorobenzene (all isomers), MCB, BHC, chloroform, benzene, and acetone.

The USEPA has also conducted a field sampling program of residential soils and attic dust separate from the Montrose RI/FS work plan. This effort, performed in accordance with USEPA procedures, focused on obtaining further information on the extent of historical aerial dispersion of DDT from the Montrose site.

Additional soil, groundwater and sediment investigations have been proposed for the RI Part 2, Phase 2A sampling effort. At least 23 soil borings are being drilled to further characterize the extent and concentration of contaminants around the former

surface impoundment area; and to characterize the distribution of contaminants in current and former drainageways and in nearsite areas which have not yet been sampled. Installation of at least 20 monitoring wells is also underway. The objectives of the groundwater investigation are to further determine the extent, configuration, and concentration of the contaminant plume(s) and the rate and direction of groundwater flow and contaminant transport. Twenty transects to measure sediment thickness have been completed in Dominguez Channel. The objectives of the sediment investigation are to estimate the volume of sediments present and to determine the distribution of contaminated sediments.

EXTENT OF CONTAMINATION AND POTENTIAL EXPOSURE PATHWAYS

Groundwater and soils at the Montrose site have been contaminated with a number of chemicals that were either associated with the DDT manufacturing process as waste products, finished products, or common industrial chemicals or were found in the soil and groundwater and may have originated from industrial practices carried out on the property or they were not expected to be found on the site, but were consistently found at concentrations exceeding background levels.

The contaminants may be classified in five chemical groups, which have been targeted for further study in the Remedial Investigation:

- . DDT (including isomers and metabolites)
- . Benzene species (including monochlorobenzene (MCB) and dichlorobenzene)
- . Acetone
- . Chloroform
- . Benzenhexachloride (BHC) and isomers

The Target Chemicals were chosen in October 1985, prior to RI Part 2 sampling. The results from the RI Part 2 groundwater sampling revealed contamination from compounds not found in previous sampling; these compounds include a number of organic solvents. There is insufficient data to determine the sources of the contamination for these compounds at this time. However, all chemicals will be considered in selecting a remedial technology.

Important properties of the target chemical compounds are summarized in Table 3-1. Transport of the Target Chemicals from the Montrose site and their ultimate environmental fate is governed by complex interactions between each compound and its physical, chemical, and biological environment. Figures 3-4 and 3-5 are schematic illustrations of these transport and fate processes.

Soils

The limit of sampling in RI Parts 1 and 2 is 10 ft deep onsite (Figure 3-6) and 60 ft in the vicinity of the former surface impoundment (Figure 3-7). These soil borings show total DDT (DDT, DDD, and DDE), total BHC, MCB, total dichlorobenzene, chloroform, and benzene concentrations exceeding background levels (Table 3-2). Highest surface concentrations of these chemicals coincide with historical production facilities, disposal areas, and drainageways, as well as with current building pad locations where grading and fill operations appear to have localized highly contaminated surface soils. The vertical extent of the contamination beyond the sampling confines is unknown; however, contamination has been found at the sampling boundaries.

In the vicinity of the former surface impoundment, DDT and MCB have been detected in concentrations greater than 100 mg/kg to depths of 60 feet. The most abundant contaminants are DDT, MCB, and BHC. These chemicals are often distributed similarly, but concentrations tend to vary irregularly with depth.

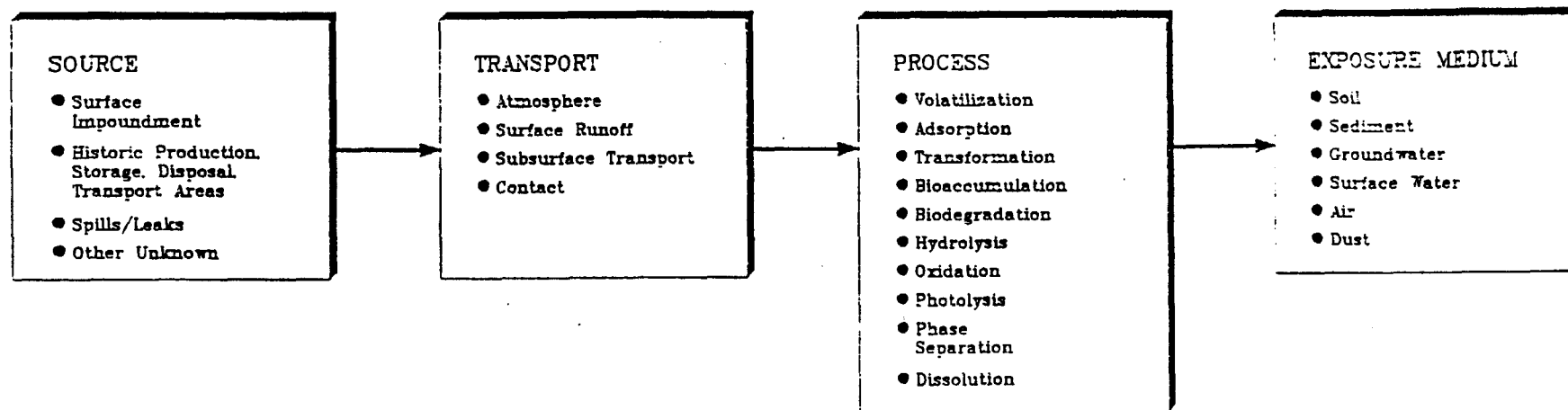
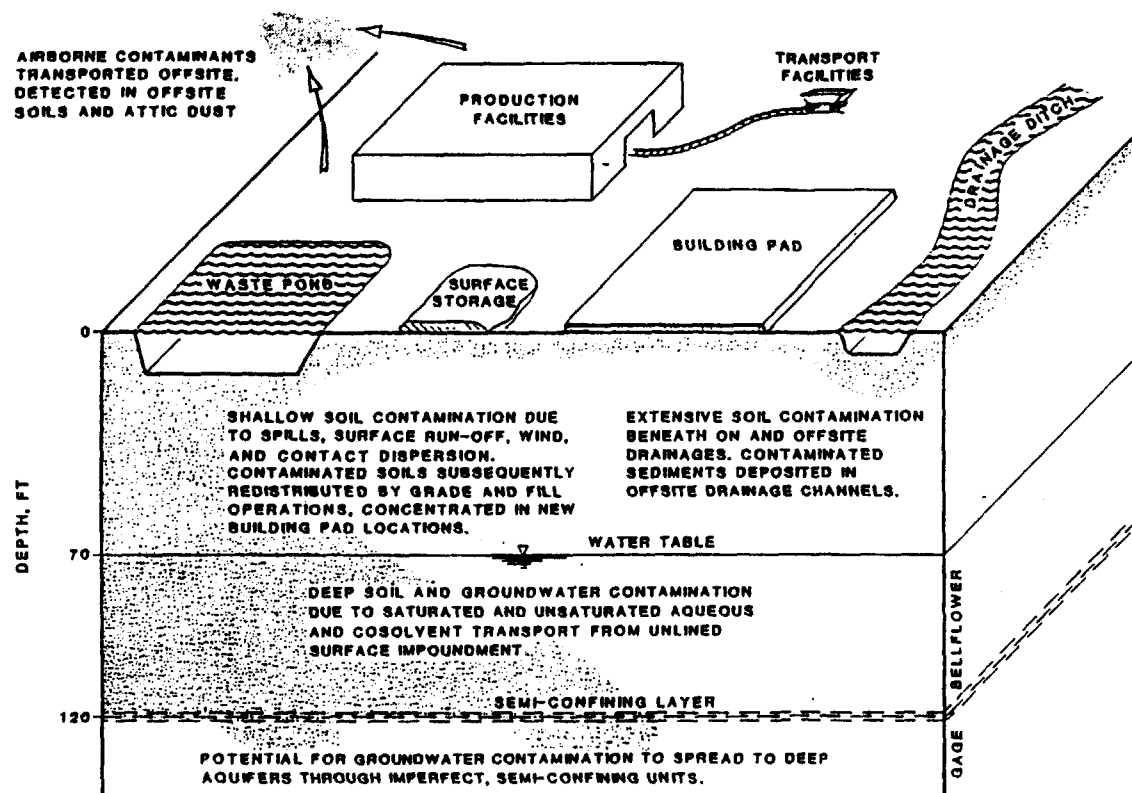


FIGURE 3-4
CONTAMINANT TRANSPORT
PATHWAYS (FLOWCHART)



NOT TO SCALE

CONTAMINATED ZONES

FIGURE 3-5. CONTAMINANT TRANSPORT PATHWAYS (SCHEMATIC)

TABLE 3-1. IMPORTANT PROPERTIES OF TARGET CHEMICALS

Chemical name	Chemical formula	Melting point	Boiling point	Density, g/mL	Vapor pressure	Solubility		Coefficient	
						In water	In solvents	Water partition	Adsorption
1,1,1-trichloro-2,2-bis (4-chlorophenyl)-ethane (DDT)	$C_{14}H_9Cl_5$	108.5-109.0°C	260°C	Solid	1.5×10^{-7} mm Hg (at 20°C)	0.0017 ppm at 25°C	Acetone: 58 g/100 mL Benzene: 78 g/100 mL Chlorobenzene: 74 g/100 mL	$\log K_{ow} = 5.98$	$K_{oc} = 243,000$
1,1-dichloro-2,2-bis (4-chlorophenyl)-ethane (DDD)	$C_{14}H_{10}Cl_4$	112°C	— ^a	Solid	10.2×10^{-7} mm Hg (at 30°C)	0.002 ppm	Similar to DDT	$\log K_{ow} = 5.99$	$K_{oc} = 243,000$ (est.)
1,1-dichloro-2,2-bis (p-chlorophenyl)-ethylene (DDE)	$C_{14}H_8Cl_4$	88-90°C	— ^a	Solid	6.5×10^{-6} mm Hg (at 20°C)	0.087 ppm (est.)	Similar to DDT	$\log K_{ow} = 5.69$	$K_{oc} = 473,000$ (est.)
Monochlorobenzene (MCS)	C_6H_5Cl	-45°C	131-132°C	1.1058 at 20°C	11.88 mm Hg (at 25°C)	0.5 g/L	Freely soluble in alcohol, benzene, chloroform, and ether	2.5 ^b	—
1,2-dichlorobenzene	$C_6H_4Cl_2$	-17°C	180°C	1.3059 at 20°C	1 mm Hg at 20°C	—	Soluble in alcohol, ether, and benzene	$\log K_{ow} = 2.97$ (est.) 3.4 ^b	$K_{oc} = 868$ (est.)
1,3-dichlorobenzene	$C_6H_4Cl_2$	-24.7°C	173°C	1.2884 at 20°C	1 mm Hg at 12.1°C	—	Soluble in alcohol and ether	3.4	$K_{oc} = 701$ (est.)
1,4-dichlorobenzene	$C_6H_4Cl_2$	53.5-54°C	174.12°C	1.275 at 20°C	1.18 mm Hg at 20°C	0.079 g/L	Soluble in alcohol, ether, benzene, chloroform	3.4 ^b	$K_{oc} = 650$ (est.)
Chloroform (trichloromethane)	$CHCl_3$	-63.5°C	61.26°C	1.484 at 20°C	200 mm Hg at 25°C	1.0 g/100 mL at 15°C	Soluble in alcohol, benzene, ether, carbon tetrachloride	$\log K_{ow} = 1.98$	$K_{oc} = 285$ (est.)
Benzene	C_6H_6	5.5°C	80.1°C	0.878 at 15°C	100 mm Hg at 26.1°C	Soluble in 1430 parts water	Soluble in alcohol, chloroform, ether, carbon tetrachloride, acetone	2.0 ^b	$K_{oc} = 33$
Acetone (2-propanone)	CH_3COCH_3	-95.35°C	56.2°C	0.7899 at 20°C	198 mm Hg at 20°C	Miscible	Soluble in alcohol, chloroform	— ^a	— ^a
Benzene hexachloride (BHC) (hexachlorocyclohexane) mixture of isomers	$C_6H_6Cl_6$	112-309°C	288-323°C	1.87-89 at 20°C	Lindane: 9.4×10^{-5} mm Hg Isomers: 13^{-5} - 10^{-7} torr at 20°C	0.13-31.4 ppm at 25°C 26 μ mol/L	Soluble in g/100 g at 20°C: acetone 43.5; benzene 28.9; chloroform 29.0; ether 20.8; ethanol 6.4.	3.6-3.2	— ^a

a. Unavailable.

b. Hansch & Leo (1979) [6].

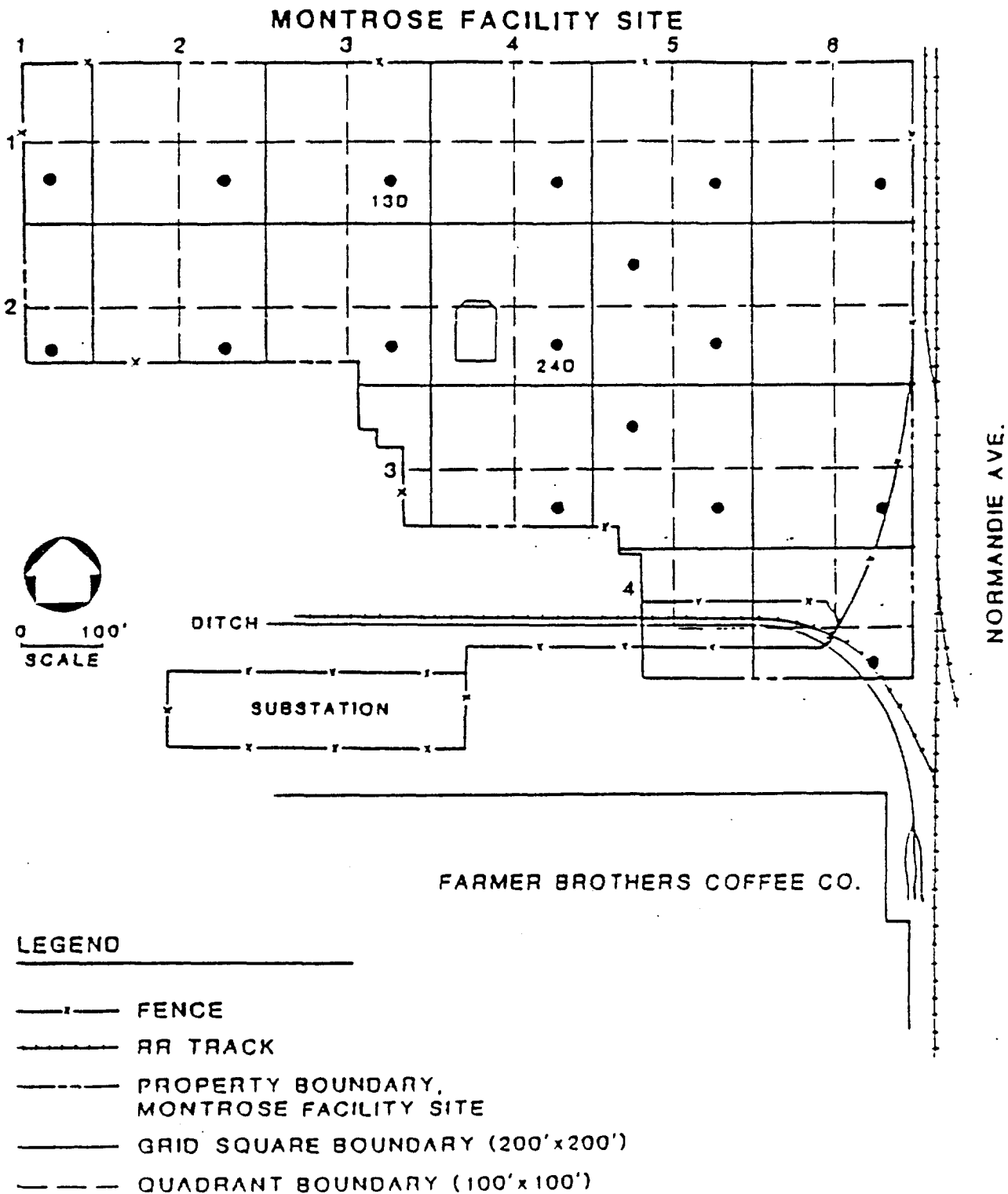
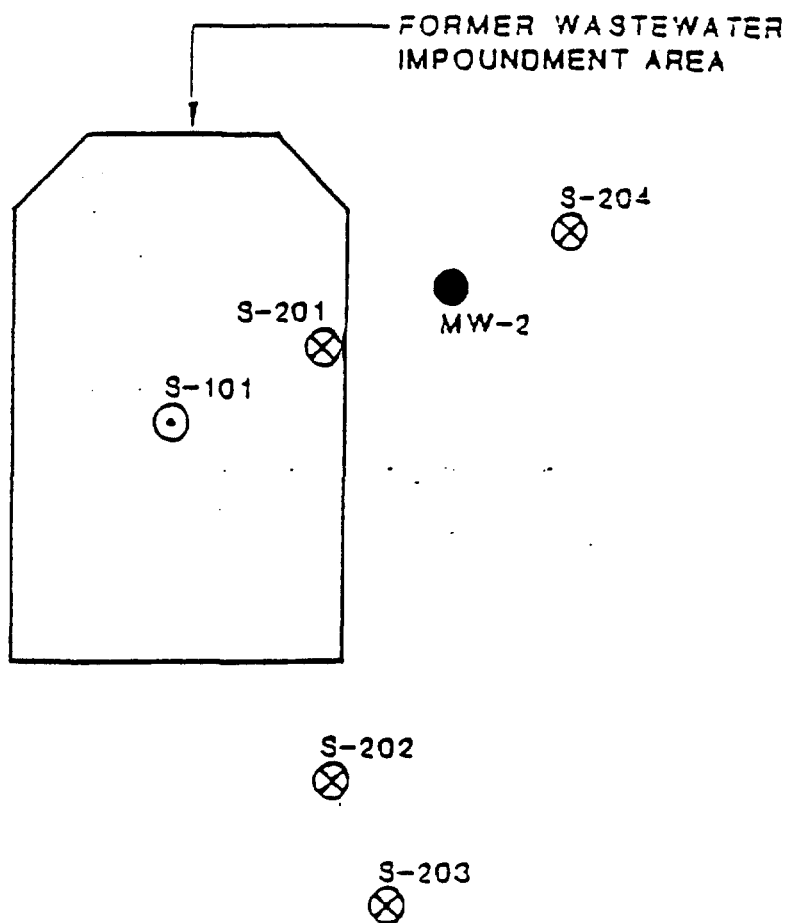


FIGURE 3-6. SHALLOW SOIL BORING LOCATIONS



LEGEND

- MW-2
● MONITOR WELL
- S-101
⊙ SOIL BORING
- S-202
⊗ SOIL BORING

FIGURE 3-7 BORING LOCATIONS NEAR SURFACE
IMPOUNDMENT AT DEPTHS >16 FT

Table 3-2. ONSITE SOIL SAMPLING - ANALYTICAL RESULTS

Compounds detected and depth of sample	Sample ID of highest concentration ^a	Concentration range in soil samples, mg/kg	Range of background sample concentration mg/kg
<u>1-6 feet</u>			
Total DDT	14D-1.5	0.007J-8,780	0.03-0.17
Total BHC	34D-5	<0.001-27	<0.01-<1
Total DCB	25D-2	<0.001-9	<0.3
Chlorobenzene (MCB)	15D-2	0.006J-360	<0.03-0.15
Acetone	35D-3.5	0.03-6	0.046J-3.0
Chloroform	14D-5	<0.05-0.68	0.005-<0.3
Benzene	-- ^b	<0.005	0.005-<0.3
<u>6-11 feet</u>			
Total DDT	14D-11	<0.12-12,080	0.03-0.17
Total BHC	24D-9.5	<0.01-42	<0.01-<1
Total DCB	14D-11	<0.001-<500	<0.3
Chlorobenzene (MCB)	24D-11	0.015-16,000	<0.03-0.15
Acetone	14D-9.5	0.024-57	0.046J-3.0
Chloroform	14D-9.5	<0.005-72	0.005-<0.3
Benzene	-- ^b	<0.005	0.005-<0.3
<u>11-16 feet</u>			
Total DDT	24D-14.5	1,960-8,600	0.03-0.17
Total BHC	24D-12.5	0-26	<0.01-<1
Total DCB	14D-13.5	65-<500	<0.3
Chlorobenzene (MCB)	24D-12.5	2,800-12,000	<0.03-0.15
Acetone	24D-12.5	<-0.063	0.046J-3.0
Chloroform	S201-16	<0.3-<6.0	0.005-<0.3
Benzene	S201-16	0.3-6.0	0.005-<0.3

Table 3-2 (Concluded)

Compounds detected and depth of sample	Sample ID of highest concentration ^a	Concentration range in soil samples, mg/kg	Range of background sample concentration mg/kg
<u>16-43 feet</u>			
Total DDT	S201-20.5	0.035-150	0.03-0.17
Total BHC	S201-16	<0.005-1.7	<0.01-<1
Total DCB	S201-20.5	5	<0.3
Chlorobenzene (MCB)	S201-16	<0.3-200	<0.03-0.15
Acetone	S201-16	<3-<60	0.046J-3.0
Chloroform	S201-16	<0.3-<6.0	0.005-<0.3
Benzene	S201-16	<0.3-6.0	0.005-<0.3
<u>46-60 feet</u>			
Total DDT	S204-59.5	0.001-4,700	0.03-0.17
Total BHC	S201-60	<0.005-10	<0.01-<1
Total DCB	S201-50.5	23	<0.3
Chlorobenzene (MCB)	S201-50.5	<0.3-4,400	<0.03-0.15
Acetone	S201-60	<3-<60	0.046J-3.0
	S204-59.5	<3-<60	0.046J-3.0
Chloroform	S201-60	<0.3-<60	0.005-<0.3
Benzene	S201-60	<0.3-<60	0.005-<0.3

Note: J = limited purposes only.

a. Number after dash indicates depth of sample.

b. Concentration contained in all samples.

9

Soils have also been sampled in nearsite and neighborhood areas. Nearsite soils were sampled down to 6 feet along the LADWP easement and the Normandie Avenue drainage ditch and total DDT was detected at these depths. Figure 3-8 shows both onsite and nearsite coincide with surface runoff and drainageways. Concentrations of total DDT range between <0.03 to 8,600 mg/kg.

The neighborhood soils have been sampled in two radii of approximately 2,000 and 4,000 ft from the perimeter of the site (Figure 3-9). Samples from the neighborhood were taken from the top 3 inches of soil. These areas are commensurate with the prevailing westerly winds and were selected to investigate the dispersion of contaminants by historical air releases from Montrose Chemical Corporation. Concentrations of total DDT range between <0.03 and 7.6 mg/kg. A background sample taken approximately 3 miles southwest of the site showed a total DDT concentration of 2.1 mg/kg. The distribution of DDT in the neighborhood soils may extend beyond the 4,000-ft radius; however, available data at this time may not provide an adequate basis for determining the distribution of DDT in the neighborhood areas.

Groundwater

The most important groundwater contaminants at the Montrose site are total DDT, benzene, dichlorobenzene, MCB, BHC, acetone, and chloroform. Table 3-3 shows the ranges of contaminant concentrations found in the Bellflower Aquitard and Gage Aquifer, the State of California and Federal Maximum Contaminant Levels for groundwater. Target and other chemicals are found in the Bellflower Aquitard and Gage Aquifer beneath the site, often at concentrations above recommended action levels. The largest variety and highest concentrations of target chemicals occur near the water table. The chemicals diminish both in number and in

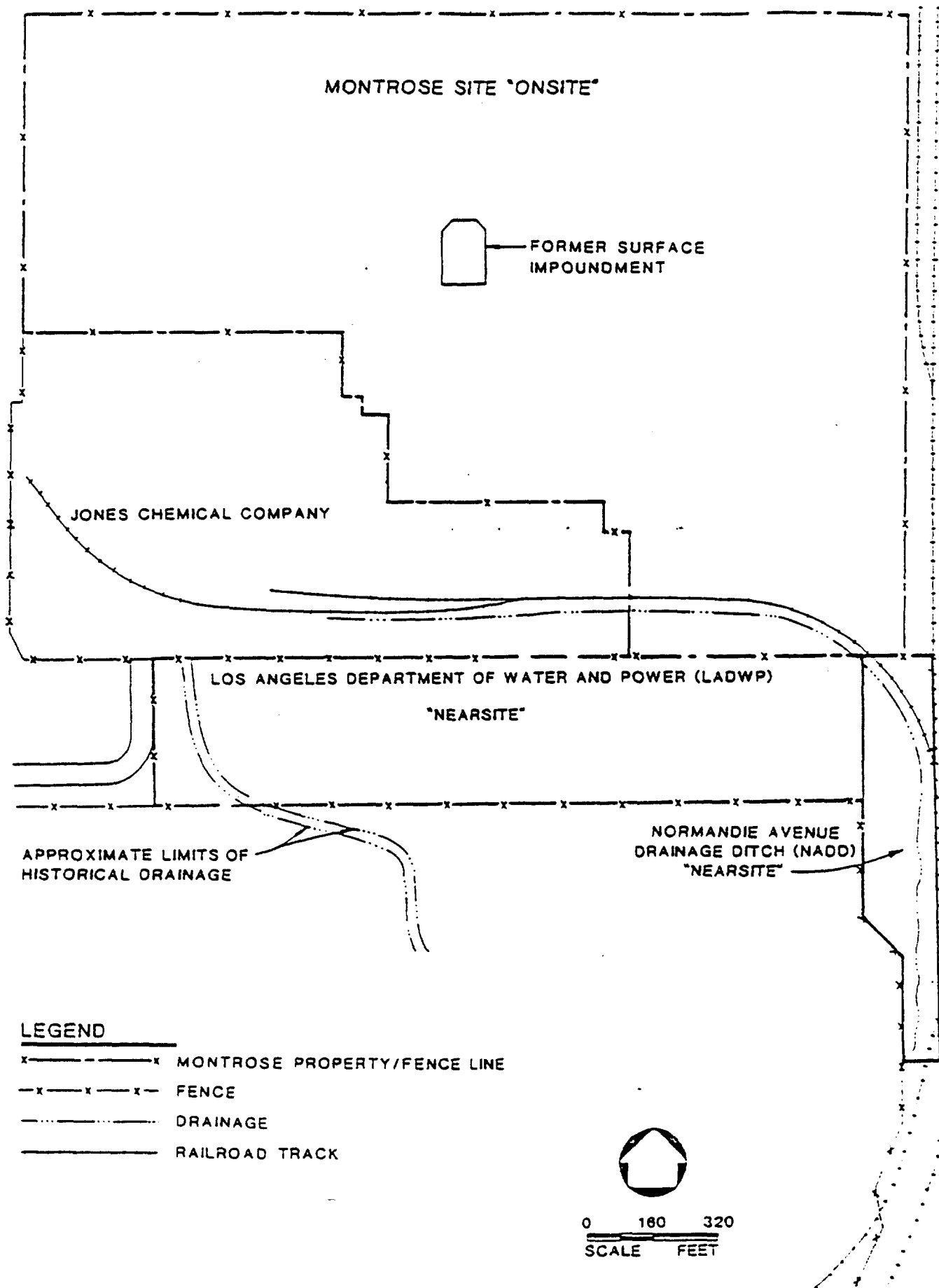
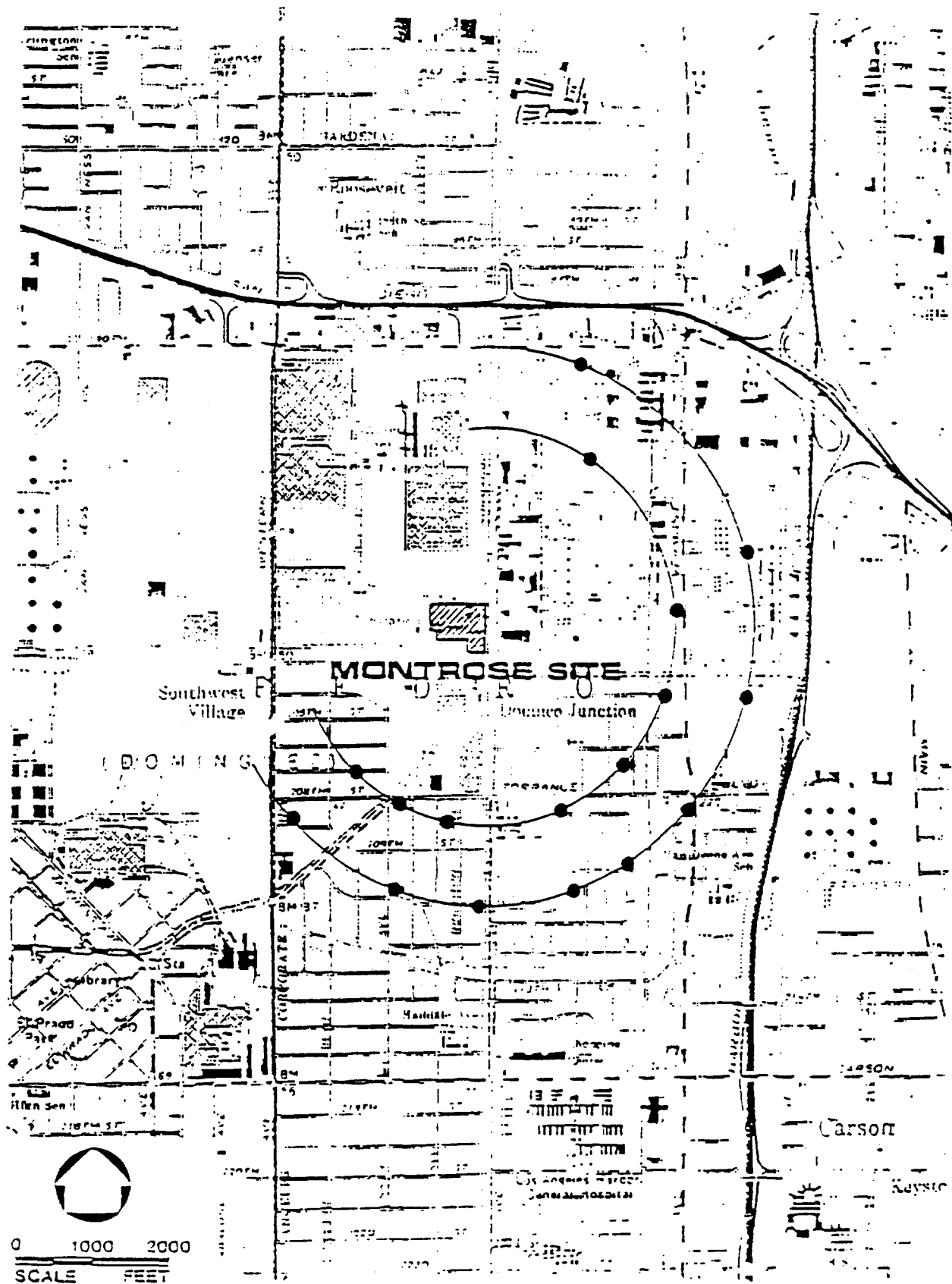


FIGURE 3-8. ONSITE AND NEARSITE AREAS



● RI PART 2 SAMPLE LOCATIONS

FIGURE 3-9. NEIGHBORHOOD AREAS

Table 3-3. GROUNDWATER ANALYTICAL RESULTS
(ug/L)

Compounds detected and aquifer screened (monitoring well series)	Concentra- tion in groundwater samples	California Maximum Contaminant Levels (MCL) ^f	Federal Maximum Contaminant Levels (MCL) ^f
<u>Upper Bellflower Wells (MW-1 through MW-5)</u>			
Total benzene hexachloride (BHC)	154-330	4 ^a	0.20 ^b
Total DDT	0.29-4,975	--	--
Benzene	ND-11,000	1 ^c	5
Chlorobenzene (MCB)	ND-660,000	30 ^c	100 ^b
Carbon tetrachloride	220-240	--	5
Chloroform	580-47,000	--	100 ^d
Tetrachloroethylene	50-3,200	2 ^c	5 ^b
1,4-dichlorobenzene	ND-736	--	75
Acetone	ND-14,000	--	3500 ^e
1,1,1-trichloroethane	1,700	200 ^c	200
1,1,1,2-tetrachloroethane	2,000	--	--
1,3-dichloropropene	1,500-2,300	0.50 ^c	--
Bromodichloromethane	1,400	--	100 ^d
Ethylbenzene	2,100	680 ^c	700 ^b
Toluene	1,300	--	2,000
trans-1,2-dichloroethylene	1,500	--	70 ^b
<u>Lower Bellflower (Wells BF-1 through BF-4)</u>			
Total BHC	0.08-7.2	4 ^a	0.20 ^b
Total DDT	0.07-2.3	--	--
MCB	420-38,000	30 ^c	100 ^b
Trichloroethylene	260	5 ^c	5
<u>Upper Gage (Wells G-1 through G-3)</u>			
Total BHC	0.02-0.2	4 ^a	0.20 ^b
Total DDT	0.08-0.35	--	--
MCB	280-20,000	30 ^c	100 ^b
<u>Lower Gage (Well LG-1)</u>			
Total BHC	0.03-0.06	4 ^a	0.20 ^b
MCB	92-110	30 ^c	100 ^b

Note: ND = not detected.

- State of California Maximum Contaminant Levels for g-BHC = 4.0 ug/L.
- Federal draft proposed Maximum Contaminant Levels, Fall 1988.
- State of California proposed Maximum Contaminant Levels, July 1988.
- Sum of concentrations of four trihalomethanes: bromodichloromethane, bromoform, chloroform, and dibromochloromethane.
- Nonenforceable safe drinking water level suggested by USEPA Environmental Criteria and Assessment Office.
- Standards as of January 1989. These are subject to change.

concentration with depth. MCB is detected at the highest concentrations and is the most widespread. Its presence above recommended action levels in the Lower Gage Aquifer warrants investigation of the underlying Lynwood Aquifer, which is a potential source of domestic and irrigation water supply.

The former surface impoundment was a potential source of chemicals to the groundwater. Other sources of chemicals were historic production, storage, and disposal areas. Contaminant concentrations in the groundwater tend to decrease with distance from the surface impoundment and are higher to the south and east of this source than in other directions. The distribution and analytical detection of some contaminants, such as benzene, dichlorobenzene, acetone, and chloroform may be obscured in analysis due to the high levels of MCB. MCB is relatively insoluble in water and is likely to exist as a separate phase in the subsurface. There appears to be a high degree of correlation between concentrations of MCB and concentrations of hydrophobic compounds such as DDT and BHC. It is therefore likely that MCB has facilitated transport of hydrophobic solutes from the surface to the groundwater.

Sediments

DDT adsorbs to sediment particles, and particle suspension during storm runoff is considered to be the primary mode of DDT transport at the surface. DDT was found in sediment samples in the Kenwood Drain, Torrance Lateral, Dominguez Channel, and Consolidated Slip downstream from the Montrose site. DDT concentrations range from 6 to 87 mg/kg in Kenwood Drain; 0.24 to 1.2 mg/kg in Torrance Lateral; 0.63 to 13 mg/kg in Dominguez Channel; and 0.03 to 0.58 mg/kg in Consolidated Slip. These sediments may continue to migrate into downstream receiving waters.

Dust

A limited number of dust samples from building structures have been collected from one residential and seven industrial sites located within a few block of the Montrose site in a north-easterly to southeasterly direction, commensurate with the prevailing westerly winds. The residential site showed a total DDT concentration of 11 mg/kg and the highest total DDT concentration at an industrial site was 266 mg/kg. Background dust samples collected 2 miles west of the site showed DDT concentrations of 2 ppm. Additional data collection may be necessary to verify DDT distribution. The majority of historical DDT migration in air occurred while the plant was still operational. The asphalt currently covering the site has reduced airborne DDT levels; however, air dispersion due to contaminated soils that are still exposed in offsite areas may continue. Dispersion may also continue if covered soils are exposed due to a crack in the integrity of the asphalt which can develop primarily through age.

Surface Water

Analysis of dry-weather surface water data showed concentrations of DDT ranging from 0.64 to 6.7 ug/L, but reanalysis of these samples gave results below detection limits in all cases (the reason for the reanalysis is not known). An analysis is currently being performed to determine if there is a correlation between the sediments and the concentration of DDT in the surface water.

Section 4

FEASIBILITY STUDY SCOPE OF WORK

The purpose of the Feasibility Study (FS) is to develop and evaluate remedial action alternatives and to determine which remedial actions are best suited for minimizing potential and existing hazards at the site. Evaluation and analyses conducted in the FS will be consistent with the procedures and requirements of the National Contingency Plan (NCP) and any subsequent revisions, Section 121 of the Superfund Amendments and Reauthorization Act of 1986 (SARA), and the EPA guidances entitled "Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA," October 1988, and "Guidance on Remedial Actions for Contaminated Ground Water at Superfund Sites," December 1988, and any subsequent revisions.

The ultimate goal of the FS is the selection of a remedial action that satisfies the following requirements:

- . Protects human health and the environment
- . Is Cost Effective
- . Uses permanent solutions to the maximum extent practicable
- . Complies with state and federal contaminant -, action-, and location - specific Applicable or Relevant and Appropriate Requirements (ARARs)

An FS will be conducted for the Montrose site. The FS will consist of the following ten tasks:

- Task 1 - Development of Remedial Action Objectives
- Task 2 - Identification of General Response Actions

Task 3 - Identification and Screening of Technologies and Process Options

Task 4 - Assembly of Alternatives

Task 5 - Further Refinement of Alternatives

Task 6 - Screening of Alternatives

Task 7 - Further Definition of Alternatives

Task 8 - Detailed Evaluation of Alternatives

Task 9 - Comparative Analysis of Alternatives

Task 10 - Feasibility Study Reports

The ten tasks will be conducted in three phases. Phase I will consist of identification of potential remedial technologies and their associated containment or disposal requirements, prescreening of these technologies, and assembling technology and/or disposal combinations into alternatives while still preserving a range of options. Phase II of the FS consists of screening the alternatives to reduce the number of alternatives. Phase III consists of the detailed evaluation of the alternatives surviving the Phase II screening.

PHASE I: PRELIMINARY REMEDIAL ALTERNATIVE DEVELOPMENT

Site-specific data from RI Part 1 and Part 2 Phase 1 and Phase 2A, will be used to develop a range of remedial action alternatives that form the basis of the FS. Treatment alternatives will be developed ranging from an alternative that will eliminate the need for long-term management or monitoring to alternatives that treat the principal threat at the site.

Task 1: Development of Remedial Action Objectives (RAOs)

Remedial action objectives (RAOs) that specify the contaminants and media of interest, exposure pathways, and remediation goals that permit a range of treatment and containment alternatives to

be developed will be identified. Remedial action objectives are medium-specific goals for protecting human health and the environment. They specify the contaminants of concern, the exposure routes and receptors, and an acceptable contaminant level or range of levels for each exposure route. Acceptable exposure levels for human health are determined on the basis of risk factors and contaminant-specific ARARs. It will, therefore, be necessary to identify contaminant specific ARARs at this time. If an ARAR is determined to be protective, it should be used to establish the acceptable exposure level. If an ARAR is not protective (i.e., presents a risk greater than 10^{-4} excess lifetime cancer risk or multiple contaminants pose a cumulative risk in excess of 10^{-4}), or does not exist for the specific chemical or pathways of concern, acceptable exposure levels should be identified through the risk assessment process.

Based on the location of the site and remedial actions, state and federal location specific ARARs are developed for the site. These requirements set restrictions depending on the characteristics of the site and the surrounding environment which include historical places and wetlands. Action specific ARARs are developed based on the performance of the technologies and are triggered by the remedial activities that are selected to accomplish a remedy.

Task 2: Identification of General Response Actions (GRAs)

General response actions (GRAs) will then be developed for each medium of interest defining containment, treatment, excavation, pumping, or other actions that may be taken to satisfy the remedial action objectives for the site. General response actions are those actions that will satisfy the remedial action objectives. Like remedial action objectives, general response actions are medium-specific. General response actions that might be taken at a site are initially defined during scoping and are

refined throughout the RI/FS as a better understanding of site conditions is gained and action-specific ARARs are identified. The volumes or areas of media to which the general response actions might be applied will be identified, taking into account the requirements for protectiveness as identified in the remedial action objectives and the chemical and physical characterization of the site. This initial determination is made for each medium of interest. Defining the areas or volumes of media requires careful judgment and should include a consideration of not only acceptable contaminant levels and exposure routes, but also site conditions and the nature and extent of contamination.

Deliverable: Draft and Final Technical Memorandum: Remedial Action Objectives and General Response Actions.

Task 3: Identification and Screening of Technologies and Process Options

The technologies applicable to each general response action will be identified and screened to eliminate those that cannot be implemented technically at the site. The selected technologies will (in the last step of Phase I) be assembled into remedial action alternatives representing a range of treatment and containment combinations. The remedial action alternatives will be compiled for sources of contamination both onsite and offsite.

The number of potentially applicable technology types and process options is reduced by evaluating the options with respect to technical implementability. Technology types refer to general categories of technologies, such as chemical treatment, thermal destruction, solidification, or capping. Technology process options refer to specific processes within each technology type. For example, the chemical treatment technology type would include such process options as precipitation, ion exchange, and oxidation/reduction. Process option and entire technology types are eliminated from further consideration on the basis of

technical implementability. RI site characterization information on contaminant types and onsite characteristics are used to screen out technologies and process options that cannot be effectively implemented.

The technology processes considered to be implementable are evaluated in greater detail before selecting one process to represent each technology type. One representative process is selected, if possible, for each technology type to simplify the subsequent development and evaluation of alternatives without limiting flexibility during remedial design. The representative process provides a basis for developing performance specifications during preliminary design; however, the specific process actually used to implement the remedial action at a site may not be selected until the remedial design phase. In some instances, it may be necessary to select more than one process option for an individual technology type. This may be done if two or more process options are sufficiently different in their performance.

Process options are evaluated using the same criteria that are used to screen alternatives prior to the detailed analysis; however, these criteria are applied only to technologies and the general response actions they are intended to satisfy, not to the site as a whole. Process options and/or technology types should not be eliminated if they only address a portion of the site contaminants. The evaluation should typically focus on effectiveness factors at this stage, with less effort directed at the implementability evaluation. Cost should not be considered at this stage of screening.

The effectiveness evaluation should focus on: (1) the potential effectiveness of process options in handling the estimated areas

or volumes of media and meeting the contaminant reduction goals identified in the general response actions; (2) the effectiveness of the process options in protecting human health and the environment during the construction and implementation phase; and (3) how proven and reliable the process is with respect to the contaminants and conditions at the site.

The implementability evaluation focuses on the institutional aspects, such as the ability to obtain necessary permits for offsite actions; the availability of treatment, storage, and disposal services; and the availability of necessary equipment and skilled workers to implement the technology. Innovative technologies should be carried through the screening if there is reasonable belief that they offer potential for better treatment performance or implementability, few or lesser adverse impacts than other available approaches, or lower costs than demonstrated technologies.

Task 4: Assembly of Alternatives

In assembling alternatives, general response actions and the process options chosen to represent the various technology types for each medium are combined to form alternatives for the site as a whole. The alternatives will range from an alternative that would eliminate the need for long-term management to alternatives that treat the principal threat at the site. A containment option involving little or no treatment and a no-action alternative will also be developed. General response actions are combined using different technology types and different volumes of media and/or areas of the site. Often, more than one general response action is applied to each medium. Depending on the interaction among the different media, it may be possible to develop media-specific alternatives rather than site-wide alternatives. This will be true in instances where the source control actions will not affect groundwater or surface water

responses. A description and the action-specific ARARs for each alternative should be included in the FS report.

Deliverable: Draft and Final Technical Memorandum:
Identification and Screening of Technologies and Assembly of
Alternatives.

PHASE II: INITIAL REMEDIAL ALTERNATIVE SCREENING

The alternatives developed in the previous task will be subjected to initial screening in order to narrow the list of potential remedial actions for further detailed analysis. The criteria to be used in screening are effectiveness, implementability, and cost. Only the alternatives judged as the best or most promising on the basis of these evaluation factors should be retained for further consideration and analysis.

Two distinct steps are conducted during the screening of alternatives: (1) the alternatives are further refined; (2) the alternatives are evaluated on a general basis to determine their effectiveness, implementability, and cost; and a decision is made, based on this evaluation, as to which alternatives should be retained for further analysis.

Task 5: Further Refinement of Alternatives

Alternatives are further refined by better quantifying the areas and volumes of media of interest and the sizes and capacities of the process options that make up each of the alternatives. Remedial action objectives previously identified and quantities of contaminated media initially specified in the general response actions are revised as required to incorporate any new information. If interactions among media appear to be important, the effect of source control actions on the remediation levels or

time frames for other media should be evaluated. Action-specific ARARs for each alternative should be identified.

After alternatives have been refined with respect to areas and volumes of media, the technologies need to be fully defined with respect to their effectiveness, implementability, and cost such that differences among alternatives can be identified. The following information should be developed, as appropriate, for the various technologies used in the alternatives:

- . Time frames in which treatment, containment, or removal goals can be achieved.
- . Rates or flows of treatment.
- . Spatial requirements for constructing treatment or containment technologies and for staging construction material or excavated soil or waste.
- . Distances to disposal technologies.
- . Required permits and imposed limitations.

Task 6: Screening of Alternatives

Alternatives are evaluated against the short- and long-term aspects of effectiveness, implementability, and cost criteria. The purpose of the screening evaluation is to reduce the number of alternatives that will undergo a more thorough and extensive analysis; therefore, alternatives will be evaluated more generally in this phase than during the detailed analysis. However, evaluations should be sufficiently detailed to distinguish among alternatives.

Effectiveness Evaluation. A key aspect of the screening criteria is the effectiveness of each alternative in protecting human health and the environment. Each alternative will be evaluated on the protectiveness it will provide, on its ability to meet ARARs, and the reductions in toxicity, mobility, or volume it

will achieve. Both short- and long-term components of protectiveness will be evaluated: short-term referring to the construction and implementation period and long term referring to the period after the remedial action is complete.

Implementability Evaluation. Implementability is a measure of the technical and administrative feasibility of constructing, operating, and maintaining a remedial action alternative. Technical feasibility is the ability to construct, reliably operate, and meet technology-specific regulations (including ARARs) until the remedial action is complete. It also includes operation, maintenance, replacement, and monitoring of technical components into the future after the remedial action is complete. Administrative feasibility is the ability to obtain approvals from other offices and agencies; the availability of treatment, storage, and disposal services and capacity; and the requirements for and availability of specific equipment and technical specialists.

Cost Evaluation. The objective of the cost evaluation is to eliminate those alternatives remaining after the effectiveness and implementability evaluation for which the costs are significantly greater than other alternatives, yet do not provide substantially greater protectiveness, unless the more expensive alternative(s) are necessary to meet ARARs. However, the focus of the cost evaluation is to make comparative estimates for alternatives with relative accuracy so that cost decisions among alternatives will be sustained as the accuracy of cost estimates improves beyond the screening process. The uncertainties associated with the definition of alternatives remain; therefore, this may preclude the definition of costs with the desired accuracy (i.e., +50 to -30%) used in the detailed analysis.

Cost estimates will be based on the following sources:

- . Remedial Actions Cost Compendium (ELI, 1984)
- . Handbook: Remedial Action at Waste Disposal Sites (USEPA, 1982)
- . Standard cost indices
- . Other readily available data

Prior estimates, site-cost experience, and good engineering judgment are needed to identify those unique items in each alternative that will control the comparative costs. Cost estimates for items common to all alternatives or indirect costs (e.g., engineering, financial, supervision, outside contractor support, contingencies) do not warrant substantial effort during the alternative screening phase.

Capital, operation and maintenance (O&M), and replacement costs are considered during the screening of alternatives. The evaluation will include those O&M costs that will be incurred for as long as necessary, even after the initial remedial action is complete. Present worth analyses will be used to evaluate expenditures that occur over different time periods. By discounting all costs to a common base year, the costs for different remedial action alternatives can be compared on the basis of a single figure for each alternative.

Alternatives with the most favorable composite evaluation of all factors will be retained for further consideration during detailed analysis. The alternative selected for further evaluation will, if practicable, preserve the range of technologies initially developed.

Once the evaluation has been conducted for the alternatives, USEPA and Montrose will meet to discuss each of the alternatives being considered. The alternatives recommended for further consideration will be discussed at this meeting so the

documentation of the results of the alternative screening is complete; any additional investigations that may be necessary are identified; and the detailed analysis can commence.

Unselected alternatives may be reconsidered at a later step in the detailed analysis if similar retained alternatives continue to be evaluated favorably or if information is developed that identifies an additional advantage not previously apparent. This provides the flexibility to double check a decision that was made previously or to review variations of alternatives being considered.

Deliverable: Draft and Final Technical Memorandum: Initial Screening of Alternatives.

PHASE III: DETAILED ANALYSIS OF ALTERNATIVES

The purpose of the detailed analysis is to analyze and present relevant information needed to allow decision makers to select a site remedy, not the decision making process itself. The end result provides decision makers with sufficient information to adequately compare the alternatives, select an appropriate remedy for the site, and demonstrate satisfaction of the statutory requirements in the Record of Decision.

The evaluations conducted during the detailed analysis phase build on previous evaluations conducted during the development and screening of alternatives. This phase also incorporates any treatability study data (see task B) and additional site characterization information collected during the RI.

Task 7: Further Definition of Alternatives

This task consists of further definition of each alternative, if necessary, with respect to the volumes or areas of contaminated

media to be addressed, the technologies to be used, and any performance requirements associated with those technologies.

Task 8: Detailed Evaluation of Alternatives

Nine evaluation criteria serve as the basis for conducting the detailed analyses during the FS and for subsequently selecting an appropriate remedial action. The evaluation criteria are:

- Short-term effectiveness - examines the effectiveness of alternatives in protecting human health and the environment during the construction and implementation period until response objectives have been met.
- Long-term effectiveness and permanence - evaluates the long-term effectiveness of alternatives in protecting human health and the environment after response objectives have been met.
- Reduction of toxicity, mobility, and volume - evaluates the anticipated performance of the specific treatment technologies.
- Implementability - evaluates the technical and administrative feasibility of alternatives and the availability of required resources.
- Cost - evaluates the capital and O&M costs of each alternative.
- Compliance with ARARs - describes how the alternative complies with ARARs or if a waiver is required and how it is justified.
- Overall protection - describes how the alternative, as a whole, protects and maintains protection of human health and the environment.
- State acceptance - reflects the state's apparent preferences or concerns about the alternatives.
- Community acceptance - reflects the community's apparent preferences or concerns about the alternatives.

Each of the nine evaluation criteria has been further divided into specific factors to allow a thorough analysis of the alternatives. These factors are shown in Table 4-1.

Table 4-1. CRITERIA FOR DETAILED ANALYSIS OF ALTERNATIVES

Short-term effectiveness

- . Protection of community during remedial actions.
- . Protection of workers during remedial actions.
- . Environmental impacts.
- . Time until remedial action objectives are achieved.

Long-term effectiveness

- . Magnitude of residual risk.
- . Adequacy of controls.
- . Reliability of controls

Reduction of toxicity, mobility, and volume

- . Treatment process used and materials treated.
- . Amount of hazardous materials destroyed or treated.
- . Degree of expected reductions in toxicity, mobility, and volume.
- . Degree to which treatment is irreversible.
- . Type and quantity of residuals remaining after treatment.

Implementability

- . Ability to construct and operate the technology.
- . Reliability of the technology.
- . Ease of undertaking additional remedial actions, if necessary.
- . Ability to obtain approvals from other agencies.
- . Coordination with other agencies.
- . Availability of necessary equipment and specialists.
- . Timing and new technology under consideration.

Costs

- . Capital.
- . O&M.
- . Present worth.

Protection of human health and the environment

- . How alternative provides human health and environmental protection.

Compliance with ARARs

- . Compliance with contaminant-specific ARARs.
- . Compliance with action-specific ARARs.
- . Compliance with location-specific ARARs.
- . Compliance with other criteria, advisories, and guidances.

State acceptance

Community acceptance

-
- a. Only very preliminary assessment of these criteria will be included in the RI/FS. They will be fully assessed in the proposed plan and the Record of Decision.

The analysis of individual alternatives against the nine criteria will be presented in the FS report as a narrative discussion accompanied by a summary table. The narrative discussion will provide a description of each alternative and a discussion of the individual criteria assessment.

The narrative discussion of the analysis will, for each alternative, present the assessment of the alternative against each of the nine criteria. Information on state acceptance and community acceptance may not be available prior to the release of the FS for public comment and, therefore, these criteria would not be addressed at this time. This discussion will focus on how and to what extent the various factors within each of the nine criteria are addressed. The uncertainties associated with specific alternatives should be included when changes or unknown conditions could affect the analysis. The results of treatability tests shall be discussed in the detailed evaluation of alternatives.

A summary table highlighting the assessment of each alternative with respect to each of the nine criteria is also included. Table 4-2 is an example of the format to be used for the summary table.

Task 9: Comparative Analysis of Alternatives

Once the alternatives have been individually assessed against the nine criteria, a comparative analysis will be conducted to evaluate the relative performance of each alternative in relation to each specific evaluation criterion. This is in contrast to the preceding analysis in which each alternative was analyzed independently without the consideration of interrelationship between alternatives. The purpose of this comparative analysis

is to identify the advantages and disadvantages of each alternative relative to one another so that the key tradeoffs to be evaluated by the decision maker can be identified.

Table 4-2. SUMMARY TABLE OF ALTERNATIVES

<u>Assessment factors</u>	<u>Alternative 1</u>	<u>Alternative 2</u>	<u>Alternative 3</u>
<u>Short-term effectiveness</u>			
. Protection of community during remedial actions			
. Protection of workers during remedial actions			
. Environmental impacts			
. Time until remedial action objectives are achieved			
<u>Long-term effectiveness</u>			
. Magnitude of residual risk			
. Adequacy of controls			
. Reliability of controls			
<u>Reduction of Toxicity, mobility, and volume</u>			
. Treatment process used and materials treated			
. Amount of hazardous materials destroyed or treated			
. Degree of expected reductions in toxicity, mobility, and volume			
. Degree to which treatment is irreversible			
. Typing and quantity of residuals remaining after treatment			

Table 4-2 (Continued)

<u>Assessment factors</u>	<u>Alternative 1</u>	<u>Alternative 2</u>	<u>Alternative 3</u>
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Implementability

- . Ability to construct and operate the technology.
- . Reliability of the technology.
- . Ease of undertaking additional remedial actions, if necessary
- . Ability to monitor effectiveness of remedy
- . Ability to obtain approvals from other agencies
- . Coordination with other agencies
- . Availability of offsite treatment, storage, and disposal services and capacity
- . Availability of necessary equipment and specialists
- . Timing of new technology under consideration

Costs

- . Capital costs
- . O&M costs
- . Present worth costs

Table 4-2 (Concluded)

Assessment factors	Alternative 1	Alternative 2	Alternative 3
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Protection of human health and the environment

- . How alternative provides human health and environmental protection

Compliance with ARARs

- . Compliance with contaminant-specific ARARs
- . Compliance with action-specific ARARs
- . Compliance with location-specific ARARs
- . Compliance with other criteria, advisories, and guidance

State acceptance

Community acceptance

Short-term effectiveness; long-term effectiveness; reduction of toxicity, mobility, and volume; implementability; and cost will generally require more discussion than the remaining criteria because the key tradeoffs or concerns among alternatives will more frequently relate to one or more of the five. The overall protectiveness and compliance with ARAR's criteria will either be or not be met. State and community acceptance will likely be evaluated only preliminarily (if at all) because such information is frequently not available. State and community acceptance will be addressed more thoroughly by EPA once comments on the FS report and the proposed plan have been received and a final remedy selection decision is being made.

The comparative analysis should include a narrative discussion describing the strengths and weaknesses of the alternatives relative to one another with respect to each criterion and how reasonable variations of key uncertainties could change the expectations of their relative performance. If innovative technologies are being considered, their potential advantages in cost or performance and the degree of uncertainty in their expected performance should also be discussed. The presentation of differences between alternatives can be measured either qualitatively or quantitatively, as appropriate, and should identify substantive differences between alternatives. Quantitative information that was used to assess the alternatives (e.g., specific cost estimates, time until response objectives would be obtained, and levels of residual contamination) should be included in the discussions.

Deliverable: Draft and Final Technical Memorandum: Detailed Analysis of Alternatives.

Task 10: Feasibility Study Reports

The Feasibility Study Report presents the findings of the feasibility study (FS) and describes the screening of remedial action technologies and the resulting remedial action alternatives. It will detail both the non-cost and cost analyses of remedial action alternatives and summarize the comparison of the various alternatives.

A Draft Feasibility Study Report summarizing the results of the FS tasks will be prepared. The report should be presented using the format on the following pages. EPA will review and provide comments on this report.

Deliverable: Draft Feasibility Study Report.

Final Feasibility Study Report

The Final Report will summarize results from earlier tasks and will include appended supplemental information.

The Draft and Final FS reports will consist of the deliverables provided to EPA listed in section 6 as Tasks 1 & 2, Identification of Remedial Action Objectives and General Response Actions; Task 3 & 4, Identification and Screening of Alternatives; Tasks 5 & 6, Initial Screening of Alternatives; and Task 7 & 8, Detailed Evaluation of Alternatives. It is EPA's intent that these documents will be chapters in the Draft and Final FS without any modification. These chapters, and one additional chapter which compares the remedial alternatives, will comprise the FS report. If EPA and Montrose agree that modifications to the previously approved documents are necessary, such modifications shall be incorporated into the FS

report. If appropriate, EPA shall extend the schedule for completion of the Draft or Final FS as necessary to incorporate these modifications.

The Final Report will incorporate comments and suggestions made by the EPA on the Draft Report. The final report will be submitted to the EPA and support agencies and be placed by EPA in public repositories for review and comment.

Deliverable: Final Feasibility Study Report.

Feasibility Study Report Format

Executive Summary

1.0 Introduction

1.1 Purpose and Organization of Report

1.2 Background Information (summarized from RI Report)

1.2.1 Site description

1.2.2 Site history

1.2.3 Nature and extent of contamination

1.2.4 Contaminant fate and transport

1.2.5 Baseline risk assessment

2.0 Identification and Screening of Technologies

2.1 Introduction

2.2 Identification of Contaminant Specific ARARs

2.3 Remedial Action Objectives--

Presents the development of remedial action objectives for each medium of interest (i.e., groundwater, soil surface water, air, etc.). For each medium, the following will be discussed:

- Contaminants of interest

- Allowable exposure based on risk assessment

- Allowable exposure based on ARARs

- Development of remedial action objectives

2.4 General Response Actions--

For each medium of interest, describes the estimation of areas or volumes to which treatment, containment, or exposure technologies may be applied.

2.5 Identification and Screening of Technology Types and Process Options--

For each medium of interest, describes:

- 2.5.1 Identification and screening of technologies
- 2.5.2 Evaluation of technologies and selection of representative technologies
- 2.6 Development of Alternatives--
Describes rationale for combination of technologies/media into alternatives.
- 3.0 Screening of Alternatives
 - 3.1 Introduction
 - 3.2 Alternative 1
 - Description
 - Evaluation of: Interaction with other media, if any
 - Effectiveness
 - Implementability
 - Cost
 - 3.3 Alternative 2
 - Description
 - Evaluation
 - 3.4 Alternative 3
 - 3.5 Summary of Screening
 - Rationale for screening out alternatives
 - Table of summary alternatives
- 4.0 Detailed Analysis of Alternatives
 - 4.1 Introduction
 - 4.2 Alternative Analysis
 - 4.2.1 Alternative 1
 - 4.2.1.1 Description
 - 4.2.1.2 Assessment
 - Short-term effectiveness
 - Long-term effectiveness and permanence
 - Reduction of mobility, toxicity, and volume
 - Implementability
 - Cost
 - Compliance with ARARs
 - Overall protection
 - State acceptance
 - Community acceptance
 - 4.2.2 Alternative 2
 - 4.2.2.1 Description
 - 4.2.2.2 Assessment
 - 4.2.3 Alternative 3
 - 4.2.4 Summary of alternatives analysis
 - 4.3 Comparison Among Alternatives
 - 4.3.1 Short-term effectiveness
 - 4.3.2 Long-term effectiveness and permanence
 - 4.3.3 Reduction of mobility, toxicity, and volume
 - 4.3.4 Implementability
 - 4.3.5 Cost
 - 4.3.6 Compliance with ARARs
 - 4.3.7 Overall protection
 - 4.3.8 State acceptance

- 4.3.9 Community acceptance
- 4.3.10 Summary of comparisons among alternatives
- 4.4 Summary of Detailed Analysis

Bibliography

Appendixes

ADDITIONAL REQUIREMENTS

In addition to the ten tasks directly related to the elements of the FS report, Montrose will conduct the following additional tasks.

Task 11: Management Plan Technical Memorandum

Montrose will prepare a draft and final technical memorandum that demonstrates that they possess the technical and managerial expertise necessary to accomplish the FS activities in a responsible manner and within the schedule. This management plan should be submitted prior to signing of the consent order amendment and should be equivalent in scope and content to the discussion of roles and responsibilities of key personnel usually contained in the Quality Assurance Project Plan. An organizational chart should be prepared describing responsibilities and lines of authority.

Deliverable: Draft and Final Technical Memorandum: Management Plan

Task 12: Technical Meetings and Communication

During the course of the FS, it will be important to maintain close communication between Montrose and EPA in order to ensure that problems will be identified and promptly corrected. Montrose will prepare monthly reports that document and summarize the progress made on the project during that month and the anticipated tasks for the following month.

Regularly scheduled meetings will be held with EPA throughout the FS process and at a frequency of approximately every other month. Interagency meetings between EPA, Montrose, and state agencies will occur, at a minimum, prior to submittal of the Draft Initial

Screening of Alternatives and the Draft Feasibility Study Report. Other meetings will be held as necessary to resolve issues raised during the course of conducting the FS.

Task 13: Groundwater Treatability Studies

Montrose shall evaluate the feasibility of conducting a groundwater extraction and treatment pilot study. The evaluation of the feasibility of a pilot-scale study shall include the following activities:

- a. An upper Bellflower aquitard pumping test shall be conducted to evaluate the hydraulic properties of the aquitard. The test will require installation of one test well and two observation wells completed in the base of the upper Bellflower aquitard. The wells will be designed to evaluate the feasibility of recovering DNAPL.
- b. Evaluate the feasibility of a pilot ground water extraction and treatment study.
- c. If agreed upon by EPA and Montrose, prepare a preliminary design for an extraction well field and groundwater treatment system based on the results of the evaluation in (b) above.

Deliverables: Draft and Final Technical Memorandum summarizing and analyzing the pump test data, evaluating the feasibility of a pilot-scale groundwater extraction and treatment study, and if appropriate providing a preliminary design of the recommended pilot study.

Task 14: Soil Treatability Studies

- a. Montrose shall prepare Work Plans for bench or pilot treatability studies for the following soil technologies: biodegradation, and incineration. Treatability work plans shall be developed for other soil technologies only as agreed upon by Montrose and EPA. The general objectives of the treatability tests are to determine the following:
 - The effectiveness of the treatment alternative on the waste (for some technologies bench-scale may not be sufficient to make a final effectiveness determination)

- The differences in performance between competing manufacturers

- Differences in performance between alternative chemicals (e.g., alum versus lime versus ferric chloride, etc.)

- Sizing requirements for pilot-scale studies

- Sizing of treatment units such that an appropriate cost evaluation can be done in the FS

- Compatibility of materials with the waste

The Work Plans shall include the specific goals and objectives of testing; an identification of test procedures; a waste sampling plan with analytical procedures; treatment goals; and the data requirements for estimating the cost of the technology within +50/-30% accuracy. Draft work plans shall be submitted to EPA for review. Final work plans shall be submitted after incorporation of EPA comments.

b. For work plans approved under subparagraph (a) Montrose shall procure contracts for test services, equipment, and chemical and analytical work to perform the work described in the approved work plan.

c. Upon completion of the treatability tests, a report shall be produced which evaluates the data from the studies, documents the results, and makes recommendations for pilot-scale or additional bench tests.

Deliverables: Draft and Final Treatability Test Work Plan and Draft and Final Evaluation Report.

Task 15: Regional Hydrologic Assessment

A Regional hydrologic assessment shall be conducted to compile and analyze existing publicly available data for the hydrogeologic environment surrounding the Montrose site. This assessment will identify potential sources in the immediate vicinity of the site that may have degraded groundwater. Task 15 results will aid in identifying environmental pathways within the hydrogeologic environment and will be used to select and evaluate remedial alternatives.

Subtask 1 - Work Plan. Montrose shall prepare a work plan describing the objectives, methodology, report outline, and work schedule for Task 15 as described in subtasks 2, 3, and 4. The work plan shall be in the form of a letter to EPA and shall be submitted within 21 days after the effective date of the consent order. Montrose will provide a final work plan within 15 days of receipt of EPA's comments on the draft.

Subtask 2 - Hydrogeologic Assessment. Based on available data and reports, A hydrogeologic assessment describing the geologic setting and groundwater conditions of the area within a two-mile radius from the Site will be performed based on available data and reports. Additionally the assessment will include a description of the boundary conditions outside the two-mile radius that define the groundwater basin. The assessment shall include the following work elements:

- a. Review and evaluate available data and reports describing geology, hydrology, and groundwater quality and use within the defined area.
- b. Perform an inventory of known wells located within two miles of the site. The inventory shall include both active and inactive water supply wells including abandoned wells. The inventory shall also include monitor wells and piezometers installed as part of other site investigations.

Subtask 3 - Alternate Source Investigation. Current remedial investigative results indicate there may be more than one source of groundwater contamination in the vicinity of the Montrose site. Montrose will conduct an investigation to identify potential sources within 1.0 miles of the Montrose site. The investigation will consist of a public records review and a field inspection of publicly accessible areas.

Subtask 4 - Regional Hydrogeologic Assessment Report. Montrose will prepare a report describing the results of subtasks 2 and 3. The report shall include the following items:

- a. A description of the regional geologic setting including the identification and extent of hydrogeologic units, geologic structure, stratigraphy, and geomorphology.
- b. A description of the regional hydrogeologic setting including of surface water features, groundwater occurrence, hydraulic properties of water bearing geologic units, groundwater movement, groundwater recharge, discharge, and storage, groundwater quality, and current groundwater use.
- c. Identification and description of known or potential groundwater degradation sources.
- d. Location and description of known wells within the defined study area.

Montrose will submit the Draft Regional Hydrogeologic Assessment report within 90 days of EPA approval of the final Work plan. Montrose will submit the final Regional Hydrogeologic Assessment Report within 30 days of receipt of EPA comments on the draft Report.

Subtask 5 - Sampling of additional wells. Upon completing the data evaluation and well inventory, select, as appropriate, representative operational wells within 0.5 miles of Montrose monitoring well for sampling. The objective of sampling these wells is to determine the distribution of chemical compounds in groundwater that may be related to past activities at the Montrose site.

Prior to sampling these wells, Montrose shall modify the sampling procedures described in the Sampling Plan, QAPP, and Health and Safety Plan to accommodate the differences in well construction and pumping equipment that may be encountered. A list of proposed wells to be sampled and proposed sampling procedures will be submitted to EPA in a technical memorandum. The draft and final technical memoranda shall be submitted by Montrose concurrent with the draft and final Regional Hydrogeologic Assessment Reports. The analytical results of water samples collected from selected operational wells shall be submitted to EPA within 45 days of the field sampling.

Deliverables: Draft and Final Regional Hydrogeologic Assessment Work Plans; a technical memorandum recommending wells to be sampled and the proposed sampling procedures; Draft and Final Regional Hydrogeologic Assessment Report; and the analytical results of groundwater samples.

Task 16: Background DDT Study

The objective of this study is to determine if DDT concentrations in soil in the vicinity of the Montrose site exceed concentrations in areas with similar land use histories. The background DDT study will integrate information from available literature with results from a regional field sampling program.

Before implementing the the proposed soil study, Montrose will prepare a letter work plan describing the background study. The letter work plan will describe the specific objectives, methodology, scope, report outline, and work schedule for Task 16.

Deliverable: Draft and Final Background DDT Workplan; and Draft and Final Background DDT Report.

Task 17: Public Health & Environmental Evaluation

The objectives of the public health and environmental evaluation (PHEE) are (1) to provide an evaluation of the potential threat to human health and the environment in the absence of any remedial action; and (2) in combination with the appropriate regulatory standards, to determine "acceptable" levels of exposure or cleanup criteria standards.

Montrose shall conduct a Public Health & Environmental Evaluation for the site in accordance with the EPA guidances entitled, Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA, March 1988; Superfund Public Health Evaluation Manual October 1986, OSWER Directive 9285.4-1, and the Superfund Exposure Assessment Manual, April 1988, OSWER Directive 9285.5-1, and Superfund Environmental Evaluation Manual, Interim

Final, March 1989. The Region 9 policy memorandum entitled, "Recommended Procedures for Implementation of Superfund Risk Assessment Guidelines," August 19, 1988, shall also be followed.

Prior to implementation of the PHEE, Montrose shall develop a detailed work plan that outlines the exact approach to be taken in completing the PHEE. The work plan should include, at a minimum, the following items:

1. A list of the target chemicals to be used for the PHEE and the rationale for their selection.
2. A chapter-by-chapter description of the contents of the PHEE specific to the Montrose site (e.g., descriptions of the specific environmental and human health exposure routes to be assessed).
3. All exposure assumptions and references for these assumptions. These should include assumptions for current as well as likely future exposure routes.
4. The name and brief description of any exposure model (groundwater flow, contaminant transport, etc.) to be used and a description of how it will be used in the overall PHEE.
5. A schedule for submittal of the draft and final PHEE.

It is recommended that a meeting between EPA and Montrose occur prior to submittal of the work plan to discuss and agree on exposure assumptions. The Draft Work Plan shall be submitted to EPA for review. After incorporation of EPA comments, a final work plan shall be submitted to EPA for approval.

Deliverables. Draft and Final Work Plan; Draft and Final Public Health & Environmental Evaluation.

Section 5

EPA RESPONSIBILITIES

During the RI/FS, EPA will be conducting tasks as required by the NCP and EPA guidelines. These tasks include:

Task 1 - Project Oversight

Task 2 - Community Relations

Task 3 - Preparation of the Administrative Record

Task 4 - Coordination with Agency for Toxic Substances and Disease Registry (ATSDR)

Task 5 - Preparation of Decision Documents

EPA may request Montrose's assistance during these activities; however, EPA will be responsible for conducting these tasks.

TASK 1: PROJECT OVERSIGHT

As lead agency for ensuring compliance with CERCLA, as amended by SARA, EPA will be responsible for overseeing the activities described in this work plan. EPA will consult with other involved regulatory agencies on a regular basis to ensure consistency and prevent unnecessary duplication of effort.

EPA will review and provide comments to Montrose on all deliverables listed in Section 6 of this work plan. All deliverables will be subject to EPA approval. The other involved regulatory agencies will be encouraged by the EPA to comment on all major deliverables. EPA will be responsible for collecting and transmitting to Montrose comments from all other interested agencies. EPA shall use its best efforts to transmit all comments concurrently. In the event that EPA submits additional

comments on the Draft FS report, Montrose's due date for the Final FS Report shall be from the time the additional comments are received.

TASK 2: COMMUNITY RELATIONS

A Community Relations Plan, generated by the EPA, will specify the most appropriate methods for disseminating information to the public. Citizens will be provided with understandable, accurate information about the progress and findings of the RI/FS. Both the final RI report and the final FS report will be circulated for public comments. Public meetings will also be held to discuss concerns expressed by the public.

TASK 3: ADMINISTRATIVE RECORD

EPA is responsible for compiling and maintaining the Administrative Record and generating and updating the index. Montrose will provide to EPA all relevant information as outlined in the NCP and any revisions, and EPA guidance on compilation of the Administrative Record. EPA is responsible for deciding which documents will be included in the Record.

TASK 4: COORDINATION WITH ATSDR

Section 110 of CERCLA requires the ATSDR to perform health assessments at all NPL sites. EPA will be responsible for coordinating with ATSDR for the completion of the health assessment.

TASK 5: PREPARATION OF DECISION DOCUMENTS

After review and approval of the final FS report, EPA will prepare the proposed plan which will summarize the FS and describe EPA's preferred alternative. This document will accompany the final FS during public comment.

After public comment, EPA (with approval or concurrence from any involved support agencies) will prepare a Record of Decision (ROD) which documents the technical and legal rationale behind the selection of remedy. The ROD will include the final administrative record index and a responsiveness summary that responds to comments received during public comment.

Section 6

DELIVERABLES AND SCHEDULE

The following list of deliverables will be submitted to EPA in accordance with the schedule discussed below. All draft documents shall be submitted to EPA for review and approval, and all final versions shall incorporate any comments or changes required by EPA. The schedule is based on calendar days; if a due date falls on a weekend or federal holiday, the deliverable shall be due on the next working day. Montrose will use best efforts to deliver documents ahead of schedule.

If Montrose's performance of any of the following tasks is delayed by an inability to obtain a required permit in a timely manner, EPA shall extend the applicable schedule to allow such additional time as may be necessary to complete the delayed task and to complete any succeeding task affected by the delay, provided that Montrose has timely submitted the applications for any required permits, and that the delay could not have reasonably been prevented or overcome by due diligence on the part of Montrose.

1. Technical Memorandum (TM): Management Plan
 - a. Draft: 21 days after effective date of this amended order.
 - b. Final: 7 days after receipt of EPA review comments on the draft management plan.
2. Tasks 1 and 2: Identification of Remedial Action Objectives (RAOs) and General Response Actions (GRAs)
 - a. Draft Technical Memorandum: 45 days after the effective date of this amended order.

- b. Final Technical Memorandum: 30 days after receipt of EPA comments on the draft technical memorandum.
- 3. Tasks 3 and 4: Identification and Screening of Technologies and Assembly of Alternatives.
 - a. Draft Technical Memorandum: 45 days after approval of the final technical memorandum on Identification of RAOs and GRAs (Tasks 1 and 2).
 - b. Final Technical Memorandum: 30 Days after receipt of EPA comments on the draft technical memorandum.
- 4. Tasks 5 and 6: Initial Screening of Alternatives
 - a. Draft Technical Memorandum: 75 days after receipt of EPA approval on the Task 3 and 4 Final Technical Memorandum.
 - b. Final Technical Memorandum: 30 days after receipt of EPA comments on the draft technical memorandum.
- 5. Tasks 7, 8, and 9: Detailed Evaluation of Alternatives
 - a. Draft Technical Memorandum: 60 days after approval of the final technical memorandum on the Soil Treatability Studies (Task 14).
 - b. Final Technical Memorandum: 30 days after receipt of EPA comments on the draft technical memorandum.
- 6. Task 10: Feasibility Study (FS) Report
 - a. Draft: 60 days after the approval of the final technical memorandum on the Detailed Evaluation of Alternatives (Tasks 7, 8, and 9). The Draft and Final FS reports will consist of the deliverables provided to EPA listed above as item Nos. 9, Identification of Remedial Action Objectives and General Response Actions; 10, Identification and Screening of Technologies and Assembly of Alternatives; 11, Initial Screening of Alternatives; and 12, Detailed Evaluation of Alternatives. It is EPA's intent that these documents will comprise chapters in the draft and final FS without any modification. These chapters and one additional chapter, which compares the remedial alternatives, will comprise the final FS.
 - b. Final: 30 days after receipt of EPA comments on the draft FS report.

7. Task 13: Groundwater Treatability Studies

- a. Draft Technical Memorandum: 240 days after effective date of this amended order.
- b. Final Technical Memorandum: 30 days after receipt of EPA comments.

8. Task 14: Treatability Studies

- a. Draft Treatability Study Work Plans: For the tests agreed upon at the time of the effective date of this amended order, the draft Treatability Study Work Plans shall be submitted 45 days after the effective date of the second amended order.
- b. Final: 30 days after receipt of EPA review comments on the draft plans.
- c. Draft and Final Treatability Study Evaluation Reports shall be submitted to EPA in accordance with schedule in the approved Treatability Study Work Plans.

9. Task 15 Regional Hydrogeologic Study

- a. Draft Workplan: 21 days after the effective date of this amended order.
- b. Final Workplan: 15 days after receipt of EPA comments.
- c. Draft Regional Hydrogeologic Assessment Report: 60 days after receipt of final laboratory analytical reports for the off-site wells sampled.
- d. Final Regional Hydrogeologic Assessment Report: 30 days after receipt of EPA comments on the draft report.

10. Task 16 Background DDT Study Workplan

- a. Draft: 90 days after effective date of this amended order.
- b. Final: 30 days after receipt of EPA comments.

11. Task 17 Public Health and Environmental Evaluation

- a. Draft Work Plan: 60 days after the effective date of this amended order.
- b. Final Work Plan: 30 days after receipt of EPA review comments on the draft work plan.

- c. Draft Public Health and Environmental Evaluation: 90 days after receipt of EPA approval on the Public Health Environmental Evaluation Work Plan.
- d. Final Public Health and Environmental Evaluation: 30 days after receipt of EPA comments on the draft Public Health Environmental Evaluation.

Section 7
STIPULATED PENALTY SCHEDULE

The events constituting Category A, Category B, and Category C penalties for the purposes of Article XI of the Consent Order are listed below.

A. Category A Penalties

1. An untimely or inadequate submittal of the following documents:
 - a. Draft & Final Well Survey Work Plan
 - b. Draft and Final Well Survey Report
 - c. Draft Technical Memorandum (TM): Identification of Remedial Action Objectives
 - d. Draft TM: Identification and Screening of Technologies and Assembly of Alternatives.
 - e. Draft TM: Initial Screening of Alternatives
 - f. Draft TM: Detailed Analysis of Alternatives
 - g. Draft and Final Background Study Report
 - h. Draft and Final Treatability Study Work Plans
 - i. Draft Treatability Study Evaluation Reports

B. Category B Penalties

1. An untimely or inadequate submittal of the following documents:
 - a. Final Technical Memorandum (TM): Identification of Remedial Action Objectives

- b. Final TM: Identification and Screening of Technologies and Assembly of Alternatives.
- c. Final TM: Initial Screening of Alternatives
- d. Final TM: Detailed Analysis of Alternatives
- e. Final Treatability Study Evaluation Reports
- f. Draft Feasibility Study Report
- g. Draft Public Health & Environmental Evaluation Work Plan
- h. Draft Final Public Health & Environmental Evaluation Report

C. Category C Penalties

- 1. An untimely or inadequate submittal of the following documents:
 - a. Final Feasibility Study Report
 - b. Final Public Health & Environmental Evaluation Report

PROJECTED SCHEDULE SECOND AMENDMENT TO CONSENT ORDER

